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STAMPEDE PASS, CASCADE RANGE, WASHINGTON.

BY

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The main obstacle to the construction of the Northern Pacific Railroad was the densely wooded Cascade Range of mountains, which extends through Oregon and Washington, a hundred and fifty miles from the Pacific shore. Prior to 1854 these wilds were but little known to white men, their rugged character and the heavy forest growth which covers them forbidding the use of saddle animals and making their exploration a difficult and dangerous undertaking. In that year, however, efforts were made to find a railway route across them by the then Capt. Geo. B. McClellan, under orders from the War Department, Isaac I. Stevens, the Governor of Washington Territory, having general oversight of the expedition, whose results are detailed in the Department Reports of 1854 and 1855. Nothing more was done worthy of mention until 1867. The Northern Pacific then began explorations and surveys, under its charter authorizing the construction of a line from Lake Superior to Puget Sound, north of the 45th parallel, and with a branch to Portland, Oregon, *via* the Columbia River, from a point not more than three hundred miles from the coast. These expeditions, occurring at intervals during thirteen years, had varying success, the engineering parties being often forced through severe weather and failing supplies, to return to headquarters with but meagre information.

Nevertheless, much was learned of the general character of the mountains and their possibilities; enough to convince the company that the difficulties of construction would be great, and that no selection of a route should be made until every part of the range had been explored. These facts diverted attention for a time to the Columbia

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River branch, as the more promising immediate undertaking. Matters drifted along, however, until 1880, when the success of the Company in raising funds to push construction west of Bismarck (the terminus since '73,) made it imperative that the route be definitely located. By this time the Oregon Railway and Navigation Co. had commenced building from Portland along the Columbia River, having in view two objects, one, to reach the wheat fields of Eastern Oregon and Washington, and the other, the construction of a line that might become the Pacific Coast outlet and connection for both the Northern Pacific and Union Pacific, the latter company having begun the construction of its Oregon Short Line, with the purpose of extending it through to the coast.

The Northern Pacific, finding its route for the Columbia River branch thus occupied, was forced to decide upon a line across the Cascade Mountains to Puget Sound. With this in view further explorations of the range between Mt. Adams and Snoqualmie Pass were begun under the direction of Col. Isaac W. Smith, with the title of Engineer Cascade Division Surveys, the objective point at tide-water being Tacoma.

For this undertaking the old Indian trails, or what remained in one case of an attempt at a waggon road, were cleared as required; and some new ones built. Thus roads for pack animals were secured through a few known passes, from which explorations were extended in any direction, as the situation demanded. Such explorations were the work of small parties of four or five men, carrying their outfits on their own backs, each party being in charge of an experienced engineer. They lasted days or weeks, according to the state of supplies or the progress attained. As snow does not quite disappear on the divide before July, snow-shoes were in many cases a necessity.

Toward the close of the same year a fair knowledge had been gained of the entire range from Mt. Adams to Mt. Baker, excepting the part about the headwaters of Green River. This stream, from its sources to within a few miles of Puget Sound, was still unknown. Its lower reaches, for twenty miles west of the foot-hills, were in a crooked coulee, one hundred to three hundred feet in depth, through which it rushed in cascades and rapids and among large rocks and tree-jams. The forests once occupying the bench lands on either side of this coulee had been, at some remote period, devastated by fire, causing the disappearance of the smaller trees and leaving the charred remnants of the larger ones strewn upon the ground in masses and windrows. A dense growth of fir brush, from

twelve to forty feet in height, had succeeded, which in turn had been in places much bent over and broken down by the weight of heavy snows. These conditions were noticeable along a belt some miles in width, at the base of the foot-hills, from White River to Snoqualmie River, but were especially marked where Green River breaks out of the mountains. They also extended eastward among the hills and along the streams. Besides, there were large and impassable swamps, particularly in the region between White and Green rivers.* On the southwestern border of this wilderness lived the tribe of Muckleshoot Indians, but there were no white men except two settlers, Geo. W. Vanderbeck and James McClintock. The Indians had a story that some of their number once crossed the jungle described, reaching Mt. Enemclaw, a great cliff at the base of the foot-hills. But beyond that point no living Indian had ever penetrated. There was, however, a tradition of a trip made by one of their ancestors to the head waters of Green River, where he found a pleasant country and good fishing.

As operations in other parts of the mountains proceeded, the possibilities of the Green River region became a matter of growing interest. It was remarked that no high peaks seemed to rise in that part of the range which the river drained; and that, even after prolonged rains, the water at its mouth was comparatively clear. We, therefore, concluded it must flow through a country where landslides were infrequent and where, consequently, a railway would occupy safe ground.

It was finally decided to have the mysteries of this region cleared up, and, as a beginning, Mr. J. Tilton Sheets, an engineer well qualified for such work, was sent to explore the main divide at the head of Green River. With his base of supplies at Thorp's Cabin, a deserted log hut on the Yakima River, east of the range, three and one-half miles below the present railway station of Easton, he discovered two passes at the head of the main fork of Green River, one of which he called *Tacoma Pass* and the other *Sheets Pass*. He did not explore about the head of the north fork, but concluded to descend the river to its mouth and report in person at Tacoma. This he succeeded in doing in a trip of some days' duration, although his supplies ran short and the party suffered great hardships, arriving on Puget Sound worn out and nearly starved.

* These two streams receive their names from their marked colour. That of the first is due to the glacial origin of some of its tributaries, which head in Mt. Rainier; that of the second, to the colour of the rocks and boulders over which it flows.

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While Mr. Sheets' principal object shortly became that of saving the lives of himself and men, he was pleased with the topographical features of the country, so far as observed, and made a favorable report, particularly of Tacoma Pass. This was in October. Returning to Thorp, *via* Portland and The Dalles, on the Columbia River, with a full party for instrumental work, he was followed by Col. Smith, who personally directed the running of levels from Thorp to Tacoma Pass, and the building of four cabins for the use of engineering parties in the following spring. These cabins were located at intervals of about five miles. Taking Tacoma Pass as a starting point, one of them was four miles westward, on the main fork of Green River, and the other three on Cabin Creek, which heads in the pass and flows eastward into the Yakima. These were named Cabins 1, 2, 3 and 4 respectively, No. 1 being near the mouth of Cabin Creek, not more than six miles above Thorp. Operations were now suspended on account of the heavy and continuous snow storms of December, the party descending the Yakima and separating at The Dalles. Four men, however, were left on the upper Yakima, two at Ellensburg to care for the stock, and two at Thorp to take charge of supplies and await orders.

Two months previously, I had been instructed to proceed to Spokane Falls, then a little settlement of three to four hundred people, and, with a party organized there, to explore the Cœur d'Alêne* range, from the pass crossed by the Mullan waggon trail, northward, toward Pend d'Oreille Lake.† My return from this exploration was made *via* Walla Walla and Portland. I reached Tacoma December 27th, meeting instructions from Col. Smith to make a reconnoissance of the Cascade range between Tacoma Pass and the head of Cedar River, in order to cover the still unexplored region about the headwaters of Green River. I was also to make such surveys of the several Green River passes as might seem advisable.

The work, this time, was to begin from the west side, by cutting a trail across the jungle to Green River, thence moving on up the stream, till stopped by deep snows. Here a base of supplies could

* When the French Jesuits, among whom was the famous *Père De Smet*, undertook the conversion of the natives of this region, they found them intractable and difficult to instruct in religious matters; and, from this characteristic, named them *Cœur d'Alêne* Indians, and the range of mountains as well, the *Cœur d'Alêne* (The heart of an awl).

† *Lake Pend d'Oreille* was so named by the early French Jesuits from its resemblance in shape to a long ear-ring. It is verily a gem in a mountain setting.

be located, progress beyond to be made on snow-shoes. With the help of John D. McAllister, the efficient commissary, our preparations were soon made and I found myself, on January 17th, at the ranch of James McClintock, one of the settlers mentioned. Here was to be the base of supplies, which could be reached by waggon. My party, all skilful woodsmen, had preceded me some days and already cut their way into the jungle several miles. We were well equipped with axes, brush-hooks, saws, camp outfit, and a pack train of *cayuse* ponies.

We continued the trail-cutting and building without delay, the exploration and tree-blazing, which should indicate the route, naturally falling to my lot, as the head of the expedition. Usually one man accompanied me to provide against accidents. A generally easterly course, towards Mt. Enemclaw, was at first selected; but, as we neared the foot-hills and occasionally gained a point whence they could be seen, the direction was gradually changed to a more northerly one. We soon found that exploration for this trail was a serious matter. Swamps and hollows impeded our progress, and we had to force our way through fir thickets and over fallen tree-trunks of great size. There were many places where the undergrowth had been bent down by snow, to a nearly horizontal position, forcing us to a choice between scrambling or walking over, or crawling under on all fours. We had many falls, and were soon black and blue about the arms and legs. Often at night, when worn out by a day of such toil, bruised, scratched and sore, and soaked to the skin, our reflections were such as would hardly bear publication.

As usual, in winter, the rain fell in torrents much of the time, forming morasses across our route, where, at another season, few would have been found. After having cut out the trail through the tangled masses of forest débris, the party was, therefore, frequently obliged to return and lay corduroy, or build rough bridges of cedar puncheons to afford footing for the ponies. While we made many detours to avoid labor, kept the camp well toward the front, and gradually increased the size of the party until forty or more well equipped men were employed, our progress was exceedingly slow. Some days, the impediments were so numerous that not more than fifteen hundred feet of actual advance could be made. Still, believing that our course ought to intersect Green River within a distance of twenty miles from McClintock's, and that, once there, we could perhaps get on faster; and, animated by an ambition to open a road across the jungle that had hitherto kept

the Green River Water Shed tightly sealed against the intrusion of mankind, we let no day go by without adding to the length of finished trail. One evening, I returned to camp with the news that during the day I had climbed to the summit of a high ridge, undoubtedly part of a spur which, followed, would have led me down to Green River. Also, that from this ridge, looking eastward, I could see far into the mountains, along the break formed by the course of the stream. On January 26th, but a few days after this, we reached Green River at a point about forty-four miles from Tacoma, by the existing railway, twelve in a direct line from McClintock's, or sixteen, following the sinuosities of the trail.

We now hoped to make more rapid progress, but found ourselves in a canyon, along whose rocky slopes the work was even more arduous than before, every step of advance being met by some new difficulty, to which rapidly deepening snow was soon added. It rained or snowed almost constantly.

Before February, many of the men weakened, compelling me to relieve them; but, as their places were promptly filled, this caused no serious delay. Experience with other streams of the range had taught me that the canyon we were in would not be many miles long, and that, beyond it, we should probably find bottom lands on one or both sides of the river. And so it proved; for on February 8th, we reached a large tributary on whose border we camped, finding the canyon beyond much less pronounced. At this point occurred the first forest of good timber. The snow, now two or three feet deep, forced us to stop all trail-cutting for the time, and to locate here the base of supplies for an advance on snow-shoes. This was Camp 7, where we remained until the 14th, improving the trail behind us, and building a log cabin and shed. We also commenced the construction of a canoe for boating supplies farther up Green River, but soon abandoned it, because a little exploration disclosed many rapids and tree jams in the stream above. This circumstance, however, gave the name to both stream and camp, which were thereafter known as Canoe Creek.

Leaving some of the men behind to resume the cutting of the trail as the snow should permit, I started on, with those best fitted for my purpose; a part of them bearing packs on their backs, the others hauling loads on sleds, and all travelling on snow-shoes. Our progress across ravines, projecting spurs and swamps, through brush and over fallen trees, was slow and exasperating. Occasionally a man would go half out of sight in some cavity beneath the snow, or stumbling, roll down a slope until stopped by bushes or

logs. As all were equally liable to these mishaps, no ill feeling was caused by the laughter that greeted their occurrence.

The sleds, an importation from British Columbia, where they are much used by voyageurs and prospectors, proved hardly satisfactory, on such rough ground. They were often bottom up, and, in getting over many places, only furnished an additional burden for the men to carry. However, before night, we reached a place already selected by previous exploration, suitable for a cache. This was about five miles from Canoe Creek by our trail, and at the mouth of a brook some twenty feet wide, which became known as Cache Creek. The next morning, we cached some of our supplies, and I detached several men from the party to bring more from Canoe Creek, until a certain quantity was accumulated. By this time, they would get word to follow on with provisions to some other camp indicated by me, in order to prevent detention of the leading party by lack of food. A party following could always overtake the one ahead, its road being already marked out by the latter, which lost much time in waiting for explorations to determine its route.

In making further advance, we encountered the usual difficulties, and in addition to them the necessity of crossing the river, a most difficult accomplishment at that time. This we were forced to do, because of a precipitous mountain, which obstructed our progress on the south side, where we had hitherto held our way. But, on the evening of the 19th, we camped in the canyon about one mile above the present railway station of Eagle Gorge, on the north bank. This was Camp 10, the distance from Tacoma by present railway line being fifty-one miles. And now began a rain which lasted, with practically no intermission, for four days, filling all the streams and gullies, and causing the river to rise to a height I had not supposed possible. Our bridge, which consisted of two great foot-logs, one across a slough and the other across the main channel of the river, was threatened, but fortunately held its own. During these days all we could do was to remain in camp, keeping up the fires and speculating on the doings in the camps below and our chances ahead. On the morning of the 24th, the cessation of rain permitted a resumption of our efforts. We had not gone far when the fog, which had shrouded us, suddenly lifted, revealing a comparatively open space, on which the sun shone brightly, bringing courage and hope to our spirits, depressed by recent experiences.

Just at this moment we caught sight of a large eagle, flying about in widening circles, directly above our heads. This appear-

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ance, which seemed to all a good omen, furnished a timely suggestion as to a name for the canyon we were leaving; and ever since it has been known as Eagle Gorge.

Progress continued slow and laborious, the principal obstacles now being the sloughs and channels which frequently cut through the bottom lands. Accumulations of driftwood, the dense undergrowth and the soft snow, liable to give way at any moment, precipitating one into a pool of ice-cold water, added not inconsiderably to our annoyances. But on March 2d we reached Camp 13, among a number of fir trees of immense size, and about a mile above a stream called, by the two Indians of the party, Smay Creek.

This point is sixty miles from Tacoma by the present railway.

Meantime, although our supplies had been replenished from Cache Creek, the outlook was not encouraging; for, with a party of ten, provisions disappeared rapidly. All had suffered greatly from exposure and labour under such unfavorable conditions, and were discouraged. But, some time previously, I had learned from Col. Smith that the two men at Ellensburg were to go on to Thorp, and, with those remaining there, convey such supplies as they could pack on their backs across Tacoma Pass, going from cabin to cabin until they reached Cabin 4; thence on as far down Green River as possible, where they were to build another cabin (Cabin 5), and try to make connection with us.

In view of this fact and our present plight, and believing that if these instructions had been executed we could not be many days' journey from Cabin 5, I decided, before we again sought the repose of our blankets, to push on with only three men, and make a spurt that should hurry the expedition to a conclusion. Accordingly, all hands were called out early the morning of the 3d. From among them I selected one as foreman and put him in charge of operations between Canoe Creek and Smay Creek, with orders to have more provisions packed up to the latter camp, those at the former being replenished from time to time by the Commissary.

The men were then named to accompany me, the principal one being Joseph Wilson, a Canadian voyageur and prospector about fifty-five years of age. An accomplished woodsman, he had a physique that endured any hardship, and was withal intelligent and kind-hearted. The others were Indians, Peter and Charley. Our outfit, which was as light as we dared make it, consisted of one or two blankets each, besides our rubber blankets, a small fly, a frying pan, tin-kettle and coffee-pot, and a few provisions, principally flour, baking powder, beans, bacon and coffee.

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We parted from the others and soon lost sight of them. Our progress being slow and difficult, we took to a ridge which we thought might parallel the course of the river and afford us a more rapid and certain route. But after some time we found ourselves getting farther and farther away from the stream, and were obliged, with what speed we could make, to again descend towards the river bottoms. In this way little direct progress was made that day, and we encamped at night in a hollow of the hillside above some warm springs, which have now become well known, being near the present railway station of Hot Springs, sixty-two miles from Tacoma. The next morning our route lay among large fir trees on the north side, where the accumulations of snow covered so much of the forest débris as to permit faster travel on snow-shoes than had hitherto been possible.

At noon, when we had stopped to make coffee, it was thought best to send back the two Indians, who, by remaining with us, would soon demolish our small stock of provisions. I therefore told them to return to Smay Creek, get more supplies, and then follow on our trail until they should overtake us, wherever that might be. Wilson and I pressed on, making camp (15) at a late hour near the mouth of what seemed to be a slough of Green River. We concluded we must be near Cabin 5, and that the following day we should keep a sharp lookout for any sign of white men. But, in spite of diligent search, no trace of our friends appeared along our route, which had been as close to the stream as the undergrowth permitted, in order to discover any large fork coming in on the south. If one became visible, the plan was to cross and explore it for some distance at least, with the hope that it might be the main stream, where would be found some sign of those we sought. The view, however, was much obstructed, the south side appearing, in occasional glimpses, steep and forbidding, while on the north there was little to oppose our progress in the open forest. We were moving on the line of least resistance.

Toward night we camped in the angle between two creeks, each about fifty feet wide, which united to form the stream that had been our guide through the day. Some further search was then made, but without result, excepting a full consideration of our situation as we sat by the evening camp-fire. We were certain that no large fork had been passed on the north side since leaving Smay Creek; a fact leading plainly up to the inference that one of the two creeks meeting at our camp must be Green River proper, while the other was its north fork; that is, unless our keeping to the

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north side had lost us the main stream altogether in the dense forest. Although the latter supposition appeared, after all, the correct one, we did not like to abandon our position without exploration of the two streams mentioned. The north fork, reported to have been seen by Mr. Sheets, might be one of these creeks; or, possibly, the one we had been following during the day, or even some other stream yet to be discovered. Green River was, doubtless, made up of several tributaries coming in from the main and lateral divides. We were among forest-covered mountains, permitting no view that might settle the vexed question of the location of the main water-course and its north fork. The only plan, therefore, promising success was to examine everything as we went along, and to do this most thoroughly we must make a laborious ascent of the hillside opposite on the north, follow its slope around eastward, and, finally, toward the south, crossing the creeks higher up between the camp and the divide. This would take us over many ravines and ridges, but would insure our crossing the trail of our friends, if it lay along any of the water-courses found. But, in spite of our hopes, the two days thus consumed seemed lost, so far as any clue to the whereabouts of the other party was concerned, and we became satisfied that the search must be made elsewhere. However, it appeared best to put in another day here and thus make this presumption a certainty.

We had to endure constant discomforts caused by the weather and our situation, not the least of which was the effort to dodge the masses of soft snow falling at intervals from the trees while we were on the march. But even with our fatigue and the annoyance caused by a growing belief that we had struck the wrong track and had thereby lost several precious days, there came to us a determination to see our mission through, at whatever cost of trouble or hardship.

And, to speak without exaggeration, matters were becoming somewhat serious. Our supplies, scant enough at first, be it always remembered, on account of the difficulty of transportation, were now nearly gone, and there was no present assurance of more under existing circumstances. For the finding of the other party had, through our mishap, become a very uncertain matter, and on the Indians, we feared, there could be placed but little dependence. Hence it appeared necessary to at once do something to help ourselves. Wilson then proposed to return alone to Smay Creek, or till he met the Indians, and take from them the provisions, while they turned back to procure more. His proposition meeting my

approval, he started out with a small pack early on the morning of March 7th, expecting to be gone two days.

Being left alone, I continued the unfinished work of the day before. Climbing the spur behind the camp, I struck out along a ridge towards the main divide and consumed a good part of the day in fruitless examinations. There was nothing to indicate that any man had ever preceded me here. But, on my return, when about a mile from camp, and retracing my path of the morning, I came upon the footprints of a wolf. The creature had crossed the ravine from the north, and, on meeting my tracks, had turned and kept along them toward camp. I had seen but few signs of animals for weeks, and was quite unprepared to find these now, fresh and clean cut, on the white snow, leading in that particular direction. But Mr. Wolf must have changed his apparent intention of raiding our ill-stocked larder, for his path soon left mine, turning down a slope and into a ravine on the south. As there still remained somewhat of daylight, I passed beyond the camp along the creek to the northeast, more to see the fine fir trees than for any other purpose. In a few moments there appeared more footprints; this time those of a big bear, partly obliterated by recent snow-falls, and about a hollow tree, which had evidently been his winter quarters. He must have been out a few days before, but, not satisfied with the weather, had returned to sleep the rest of the season.

In the lengthening shadows, I prepared a solitary supper, and ate it without my usual appetite, and as quietly as possible. Sitting by the fire thinking over my situation, I realized that it was somewhat dangerous, especially as I supposed Wilson to be fifteen or twenty miles away. Fire-arms there were none, except my revolver, which could hardly be taken into account, not having been discharged for months. But the reflection, that never in my own experience, had I known harm to come from wild beasts, greatly served to still my fears, already partially lulled by Nature's potent soporific, fatigue. I therefore crawled into my blankets and composed myself for sleep, in the best manner possible under the circumstances.

I had become fairly tranquil, speculating dreamily on the probability of an awakening before morning caused by the howling of wolves, or by the intrusion of a bear's snout among my blankets, when roused to an acute perception of surrounding things. A sudden loud snap, painfully audible in the stillness of the night, as of a branch breaking on the other side of the stream, I felt sure was caused by the bear, which might, at any moment, approach my

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resting place. In this I was, however, presently proved mistaken, as Wilson, and not Bruin, peered in under the fly, saying, cheerfully, "Boss, are you asleep?"

He had met the Indians and taken from them most of the provisions, sending them back for more. A long, weary day he had made of it, and, as he told his story, I conceived a gratitude and friendship for him which I shall never lose. For, in spite of a fatigue so extreme that he felt feet and legs could endure no longer, he had left his snow-shoes on some bushes, crawling on hands and knees the rest of his journey, more than half a mile; and, all because he felt it his duty to return to me that night.

We were now confident of being on a north fork, instead of the main stream. To regain the latter, we must retrace our footsteps, carefully on the lookout for its mouth on the south side. The start the next morning was a late one, our rest after so much fatigue having been undisturbed, long and refreshing. Departing from this abiding place of uncertainties, we christened it Lost Camp, while the north fork became known as Sunday Creek. Keeping as close to the creek as possible, we observed no change either in forest or stream, for nearly three hours, when appeared a comparatively wide basin, such as might be looked for at the junction of two water-courses. Wilson, pressing forward, through the heavy undergrowth, said there were indications of a large tributary on the other side, a little below, and that we had better cross and explore. This we did, partly on drift-wood and partly wading, and were soon repaid for our efforts, by the sight of a stream, considerable enough

VIEW ON GREEN RIVER.

in size to assure us that it was the main river. Following it, as we had already planned, in less than half an hour we suddenly came upon the nearly obliterated imprints of snow-shoes. All these led eastward, or up stream, and could only have been made by the men who were to build Cabin 5. They had evidently done what they could and returned to Thorp.

Tracing back the snow-shoe tracks, a few hundred feet across the stream, we found the cabin, a rude affair, evidently built in haste. There being nothing in or about it to detain us more than a moment, we pushed forward, intent on going as far as possible before night-fall, following the trail of our friends leading across Tacoma Pass to Thorp. Success raised our spirits, giving us new strength for the rapid journey of the day. About 3.00 P.M., Cabin 4 appeared, so buried in the snow that a descent of some feet was necessary to reach it. We entered, through the door, left purposely unfastened by the party preceding us, and were rejoiced at the sight of a rough fire-place, provisions, and utensils for cooking them. As we had eaten nothing since morning, this opportunity was by no means neglected. Leaving here such articles and supplies as could be safely dispensed with, we started again, intending to reach Cabin 3 before night. The hills soon closed in upon us, steep and slippery. The stream, which now plunged in cascades down a gorge, was bridged in many places, by foot-logs, placed from ten to forty feet above the torrent, whose crossing was perilous, while the ascent beyond became slow and toilsome. When we finally arrived at the summit, fast-falling snow and approaching darkness made it difficult to read the two aneroid barometers I had carried throughout these journeys. Over the descent, on the east, night fell suddenly, shutting out all signs of the trail, and leaving only as a guide, the features of the ground, which kept us in the depression between the hills. Travelling thus for about an hour, we came abruptly upon a big mound of snow, which, on close inspection, proved to be Cabin 3. This was only a bare shelter, where we made a light supper on some food we still had with us, and passed a comfortable night, early dawn seeing us on our way. The course was now nearly all down hill. The woods were comparatively open, the trail was well marked, and the snow, which covered many obstructions, in good condition for snow-shoeing. Thus it was that we made a rapid march, reaching Thorp before dark, and meeting the men we sought. They had arrived but three days before, and were preparing to return to Cabin 5 with more supplies.

Having sent Wilson and a companion to Tacoma, with a report

of our trip, I left Thorp on the 14th and went to Cabin 3, where supplies for the proposed expedition northward, along the range, had preceded me. One man had been left behind, in care of the place, and with instructions to observe and note the readings of an aneroid, at morning, noon and evening, of each day of our absence. The remaining three men, James Gregg, Andy Drury and Mathew Champion, accompanied me. The next day, we explored about Tacoma Pass and Sheets Pass. On the 16th, everything being in readiness, we started northward, following a tributary of Cabin Creek to its source, on a spur, elevation 4,400 ft., where we camped for the night in deep snow, among balsam trees, and within a short distance of the main divide. In the morning we climbed to the top, where there was but little timber, and where the range was sharp and well defined, with a course nearly due north. Progress was rapid until afternoon, when the general direction curved to the northeast, and a mountain confronted us, up whose sides the forest extended to its very peak. At its summit the barometer marked nearly 5,500 ft. elevation. Here the timber ceased abruptly, affording a grand panorama of the surrounding mountains, except towards the north, where projecting spurs and the forest cut off the view.

Our course was now nearly due east, until we reached a much lower elevation, where we called a halt for the night. At the beginning of the descent, one of Andy Drury's snow-shoes caught in the other, throwing him headlong down a steep slope, and plunging him into the snow, nearly out of sight. From this incident came the name of the mountain, Snow-Shoe Butte. The railway now skirts a portion of its base. For several days we had been blessed with fairly good weather, but the next was one of the most dismal I remember having seen. It blew a gale and was severely cold. With the wind came a thick fog, which, added to the gloom of the balsam forest, made our movements groping and uncertain. The moisture seemed to congeal in small, sharp crystals, which found lodgment in every wrinkle or fold of our clothing, and also made it difficult to face the wind. Making for the highest ground, we did our best to follow the divide, whose crest was no longer clearly defined. This, however, soon changed its course from an easterly to a southeasterly one, and, also, fell off rapidly in elevation. As we felt our way along, the constantly descending course of the ridge led us to conclude that, since morning, we had, somehow, missed the main range, and must be following a spur which would lead to Yakima River. So little was visible that some brief

explorations only added to the uncertainty; and we spent the whole day crawling about the northerly slopes of the mountain, in the endeavor to find a ridge so decidedly bearing north as to give assurance that it was the main divide. At night we brought up near the previous night's camping place, annoyed at the loss of time, but now quite certain that our morning journey was in the right direction, and that, if we had pursued the ridge farther, we should have come to a bend to the north, an indication that it was none other than the main range.

Those who have ever had occasion to trace an unknown divide, where the view is cut off by dense forests, understand how easy it is to get astray on some spur, or lateral ridge, and follow it, perhaps for hours, before the mistake is discovered.

Starting early on the 19th, with our route for the morning, at least, quite settled upon, and, with favouring skies that lightened our hearts, we made excellent progress. A little after nine o'clock, appeared a sharp bend in the ridge to the north, as anticipated, whence we descended, along a well-defined crest, so rapidly that in less than an hour the barometer marked only 3,495 feet elevation, at a point where, for a little distance about us, there were no trees. It was evidently one of the lowest parts of the divide. To the east, a spur cut off much of our view, but facing west we looked down Sunday Creek. Beyond its confluence with Green River, were the mountains to the south, covered with dark fir forests, and, back of them, the great snowy mass of Mt. Rainier (Tacoma),* sharply defined against the blue sky. It was a beautiful scene, and so impressive that for a moment all were silent.

Thence we continued our trip northward, finding several other depressions in the range, but none as promising as the one just described. We finally descended from the divide to Lake Kitchelos, the source of the Yakima, arriving at Thorp the afternoon of the 23d.

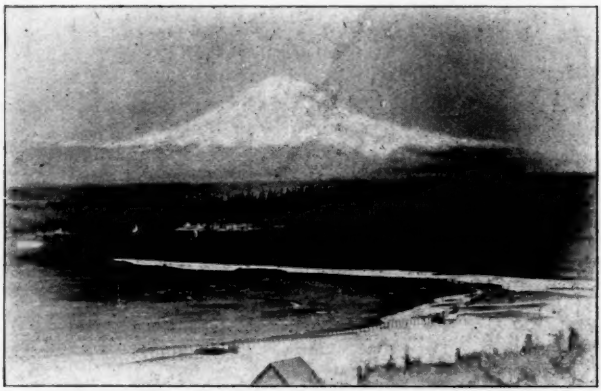
The exploration now finished, although toilsome and often discouraging, had made the Green River region accessible. Surveys which then succeeded were followed by the building of the Cascade

* The peak was named in May, 1792, by Capt. George Vancouver, R.N. In his *Voyage of Discovery to the North Pacific Ocean, etc., etc.* (3 vols. 4to and Atlas, London, 1798), is the following passage (vol. 1, p. 235):

"... the round, snowy mountain, now forming its southern extremity, and which, after my friend Rear Admiral Rainier, I distinguished by the name of Mount Rainier, bore N. 42 E."

The original Indian name of the mountain, Tacoma, is said to mean *the nourishing breast.*

Division of the Northern Pacific, under my own direction, through the pass we had found, thus closing the gap in the main line that connected Lake Superior's waters with those of Puget Sound.



MT. RAINIER, SEEN FROM TACOMA.

The Pass was, for a time, known as Garfield Pass, in honor of a President, during whose last days it was discovered, but, later, it was named Stampede Pass, from the following incident. Some weeks after its discovery, while encamped on Sunday Creek, I became dissatisfied with the progress of the party cutting trails which would be required before instrumental surveys could be extended across the divide, and sent them a foreman well known as a hard worker. His arrival became the signal for the flight of several men from the locality which was but a few hundred feet west of the summit, and which thus obtained a name; both their camp and the small lake near it, and, later, the Pass itself being called Stampede. The elevation of the Pass, as corrected by the aneroid at Thorp, whose elevation was known from instrumental survey, proved to be 3,725 feet. As determined by spirit level, it is 3,693 feet. The summit tunnel, 9,850 feet in length, reduces this figure to 2,850 feet.

The traveller of to-day, who crosses the Cascade Range with the ease and rapidity made possible by the railway, cannot realize that nearly three months were consumed by the expedition I have described, while at no time was the party more than one hundred miles from Tacoma.

When one visits the thriving cities and towns reached by this

railway, where, before its construction, stood mere settlements or unbroken forest, one begins to appreciate what a significant factor it has become, in the development of a most interesting and important section of the country; and the engineer feels how great a thing it is, to be one of the many forces that go to the consummation of such an enterprise.

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THE COAST DESERT OF PERU.

(A Lecture delivered before the American Geographical Society by Maj. ALFRED F. SEARS, M. Am. Soc. C. E.)

No country on the face of the earth has been the subject of more fine writing by the itinerant magazine men of the United States or the victim of more pictures by the snap-dragons of art than the land once conquered and civilized by the wonderful children of the Sun, brutalized by the Arabs of Spain under the bloody banner of the Latin Cross and immortalized by the brilliant pen of the American historian, Prescott. And yet we are able to boast the possession of a denser ignorance touching that republic, nearer to us than San Francisco or Liverpool, than we would like to acknowledge concerning the Sudan or Abyssinia.

We have important interests there, and the people of Peru, more than any other nation, our laws are copying and all our methods learning. Vast amounts of American capital and American genius have been exercised in Peru. When our countryman, Henry Meiggs, died, he left contracts of $124,000,000 in the hands of his executors, which have since passed into the coffers of Englishmen. American capital is in the mines of Peru, working; in shipping also, in railroad building and the richest crops of the tropics farming. The most extensive sugar machinery in the world is at Lurifico, in the coast desert of Northern Peru, and is the property of an American, formerly a civil engineer of one of Mr. Meiggs' railroads. The immense ice-making and brewing establishment of Backus & Johnson in the capital city of Lima furnishes ice and beer to the whole south Pacific coast, and is another case in point where two young men who went out there, assistant engineers on the Meiggs contracts, turned their attention to other enterprises, when the railroad systems were paralyzed by want of money. In 1890 they sold their plant for £500,000 to an English syndicate and are retained in its management. The same men have developed the Casapalca silver lode, where they are doing some profitable mining. Another American engineer has devised a system of irrigation for the vast fertile plains of the valley of the river Piura in Northern Peru, and has organized a company in New York of some of the wealthiest merchants engaged in South American trade.

But my countrymen have written more fiction of Peru than that

unfortunate country deserves. One well-known writer told us five years ago of a revolution which he saw in the streets of Lima, when the truth is, that until this year, Peru has seen no revolution since 1849. A newspaper said, "A cargador assaulted a fellow on the street and was arrested by a policeman, when his companions attempted his rescue. But the timely arrival of a squad of police suffocated the revolution in a half hour." The press of South America is learning the mistake of using this word "revolucion" for every little street row or regimental revolt, which they are coming to comprehend does something worse than sell newspapers, inasmuch as it injures the credit of their governments. It was, however, the natural rodomontade of the Arabian. A late writer, among other falsehoods, declares that the streets of Lima are as narrow and crooked as those of Boston, whereas the map of that city, laid out more than a century before William Penn made the plan of Philadelphia, shows that it might easily have been the model of the more modern American capital in every feature of a city street. No checker-board lies in squarer squares or straighter lines. One George Fitz-Roy Cole, of London, in a book, which he entitles "Peruvians at Home," when writing of the Plaza of Lima, breaks forth into such stupendous falsehood as this: "Of how many important events in Peruvian history, of how many sanguinary scenes has this plaza been the scene. * * * How many unpopular presidents have been sacrificed to the vengeance of the public and hung from the top of the round towers that stand on each side of the cathedral door, it would take long to enumerate." The Society may discover in the view presented of the cathedral, and every periodical of this country has published similar views, that the towers of the cathedral are emphatically square, and that the door consists of three grand portals. We recognize thus the amount of acquaintance our author has had with the City of Lima. The truth is too evident, that these professional tourists deceive their employers. If they see a country at all they rush across it with one eye shut and the other filled with the dust of prejudice. But with all this allowance, it is difficult to understand how Peru has acquired the reputation of assassinating presidents. A minister of the cabinet of Balta assassinated that president in the palace of government and proclaimed himself dictator. He was immediately seized by the citizens whom he had outraged and lynched to death and the legally elected candidate, Manuel Pardo, was put into the position to which the people had chosen him. Gutierrez was thus executed by the people whose patriotic con-

science he had offended, and his body was hung from a scaffold which had been used in the repair of one of the cathedral towers and not yet removed. This is the story and the sequel of the only assassination of a president in all the history of Peru; meantime this United States has treated the world to the spectacle of two such horrors.

The people of Peru are not a warlike people; they are not in any way revolutionary. As they were the most civilized of all the aborigines of the American Continent, so to-day they are the most refined, most gentle and most lovable of all the Latin-American states. The young men of Peru of the well-to-do classes are better educated than the same class in any other country with which I am acquainted, excepting Prussia. It is no unusual thing to find them conversing in the drawing-room with men of English, French, Portuguese and German birth as if those tongues were their own.

A large foreign population of Peru testifies to the safety of the country for foreign interests. When the nation was in the midst of great suffering from Chilian invasion, the property of foreigners was sacredly guarded from spoliation on the part of the hungry masses. Every foreigner will testify to the perfect protection he enjoys under all circumstances in his property, his family rights and his life. In short, for beauty of climate, delight of social life and all association, Peru is one of the most charming of countries.

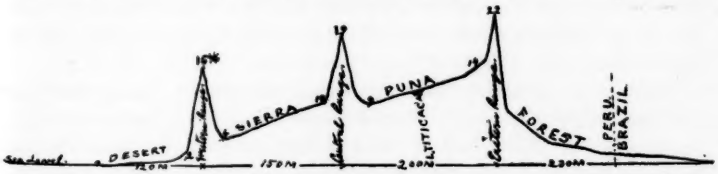
There is a popular superstition among Americans that Peru is a long way off and difficult of access, and this belief is made a reason to the American for not investing in the country. A glance at the map illustrates the mistake. There is no difficulty in discerning that Lima is about the same distance from New York as San Francisco. But the truth is, that if one considers the itinerary of any railroad line to the Pacific coast, it is seen that Paita, the northern port of Peru, is considerably nearer to us than the California metropolis. The voyage, too, is a charming one. When you have left Sandy Hook in a ship of the Pacific Mail or the Columbian Company your course due south, in twelve hundred miles, takes you so near to the east end of the island of Cuba, you see the light-keeper's family standing out on the sands watching the great ship go by. Then steering S. by W. you run across the Caribbean Sea, 800 miles into the bay of Colon, where, on the Isthmus of Panama, a short railroad ride of about fifty miles relieves the tedium of the sea voyage, to be resumed at Panama in the splendid ships of the Pacific Steam Navigation Company. The distance to Paita is 900 miles and to Callao, the port of the capital city of Lima, 500 farther.

Thus you have a trip of only 2,800 miles to Paita and 3,300 to Callao.

Arrived at Callao, one meets a system of docks such as are not possessed by any port in this country, unless we except the City of Boston.

The Zona-seca,—dry zone—of Peru, extends the whole length of its coast, from the northern limit of 3 S. lat. to 22 S., now in the possession of Chile since the peace of Ancon, which ended the late war between the two republics. This zone measures 2,000 miles in extent along the coast, while covering only 1,200 miles of latitude, and is 120 miles wide in the extreme north, narrowing to barely twenty at the southern limit. The coast is well supplied with harbors, in bays sheltered from the south-western sea swell, but there are also many ports where the ships of the coasting trade must remain in open roadsteads, exposed to the uncomfortable rolling of such places.

The bays of Paita, Sechura, Chimbote, Callao, Samanco and Norato are secure, land-locked havens, every one of which can be easily defended by shore batteries and is of capacity for the largest ships that float. The attention of the American government has often been called by our naval officers to the expediency of asking a coaling port of Peru in the magnificent Bay of Chimbote, a harbor eight miles long and four wide, with first-rate anchorage and depth for our largest war vessels. Chimbote is at the mouth of the Santa Valley, famous for its coal deposits.



THE FIGURES ALONG THE PROFILE LINE DENOTE THE NUMBER OF THOUSANDS OF FEET ABOVE SEA LEVEL.

The accompanying sketch is a profile across the northern part of the republic, and shows the division of its territory by the different ranges of the Andes. The Coast Desert rises gradually from the level of the Pacific to nearly a thousand feet when the profile enters the foot-hills and we ascend the western range of the Andes, peaks of which attain a height of 15,000 feet above the sea; crossing this cordillera, we go down to the plain of the sierra, which stretches away to the east, rising in a distance of 150 miles to

10,000 feet, and then come to the middle cordillera, in which are peaks 19,000 feet above the ocean. After passing this ridge, we fall again to the Puna (a word signifying hard breathing), which at this western edge is 9,000 feet above sea-level, and, like the sierra, rises in a broken plain to a height of 14,000 feet at the foot of the grand eastern cordillera of the Andes, where the noblest mountains of the continent are found, summits of which are 23,000 feet above the level of the ocean.

The Coast Desert as seen on this profile is embraced in the Department of Piura, the northernmost section of the republic and in every respect the richest of the country. Every reader knows something of the nitrate coast of Peru and of the conservative effects of saltpetre. I met a droll illustration of this influence combined with that of the atmosphere, at the port of Paita on the edge of the great coast desert. One morning walking in the cemetery, I saw a coffin lying outside the dead-house and uncovered. In it was the body of a man, whose purple shirt and cotton drawers bespoke the corpse of a priest. I visited the curate of the parish to speak of what I thought a disgraceful circumstance, with some reproach for his disregard of the condition of the cemetery. "Ah!" said the curate, "my dear sir, you don't understand; that is a friend of mine, that I have put out there to dry so that I may send him to his family in Guayaquil." Thus you may comprehend the mummies of Peru.

With the aid of this profile it is easy to understand the phenomena which produce the aridity of the region that we call the Coast Desert as well as some other interesting meteorological conditions.

The vaporizations of the Atlantic and the great water area of the Amazon basin are blown by the trade winds across the continent, leaving in the region east of the Andes their heavier condensations and all the territory over which they pass, enriching. And the eastern cordillera reaching, they are thrown by the obstructing ridge into the extraordinary altitude of 20,000 to 23,000 feet above the level of the ocean, encountering a degree of cold that squeezes still more moisture from the magazine of cloud; yet, not quite all, for upon the Puna falling, they drop treasures there of cold rain, mist, snow and sleet, and then reaching the middle range are almost entirely exhausted, but at certain seasons are able to wet somewhat the plains of the sierra.

There is, therefore, no water for the western range, which is accordingly in the arid belt like the pampas of the coast.

And yet sometimes there are rains in the western cordillera, the origin of which it is interesting to consider.

The trade winds having reached that ridge and being already robbed of their cargoes of vapor, stand out towards the Pacific Ocean and thence on across the globe in their proper zone. But now an obstacle occurs to interrupt their march. The torrid sun, shining on the desert along the coast, rarefies the atmosphere and to fill the partial vacuum thus created, a part of the air, which had passed out to sea comes rushing back, and so we have a sea breeze after eleven o'clock in the morning when the desert has grown warm under the blazing beams. This wind from the sea is delicious; it was sifted through the snow-clad Andes, it has passed through the sunshine of the pampas, has been again tempered by the soft vaporizations of the ocean, cooled by the Antarctic or Humboldt current, and is now turned again to the grateful land through the beneficent laboratory of Nature, a truly heavenly gale.

Ordinarily, this returning wind fails to bring from the ocean vapor enough to afford rain. But in the midsummer months of December, January, February and March, when the vaporizations are most rapid and voluminous, there is sufficient for a considerable condensation in the western cordillera, which amounts to rain and sometimes to a very heavy rain. Once in a cycle of years—as we shall presently see—the rain extends from the mountains nearly to the Pacific shores.

The re-entrant wind-current is felt at sea a distance of fifty to a hundred miles, so that navigators passing the coast must keep outside that distance to get the influence of the trades.

After the earth of the desert grows cool in the evening, the wind sets in the opposite direction, and you feel in the pampas a breeze directly from the mountains, so cool, a blanket is good on the bed and a thick poncho if you are riding in the open air.

This meteorological condition makes it practicable to raise coffee in the coast valleys of Peru; the cool, moist atmosphere being the equivalent of the 2,000 to 4,000 feet above sea level essential for the plant in all other regions where it is raised.

The traveller, who follows the course of Pizarro in the steamers of the Pacific, wonders when he enters the bay of Paita, whence came the fruit and flowers brought as presents by the aborigines, "to the vessels of the discoverer." Before him and all around the bay, rise the naked walls of the barranca, three hundred feet above the beach, from base to summit and bald as any rock, a brown, gray sand utterly unpromising. Going to the plain above, he

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beholds only a treeless desert stretching away to the foot-hills of the still more distant cordillera; no living green thing, no blade of grass, no little shrub gives rest to the eye, wearied with the dreary wastes of sand. For land-marks some ledge of gypsum crosses the trail that leads into the mesa towards the towns of the Piura valley and the Chira; an insignificant eminence scarcely a hill, too hard baked in the sun to be blown away, forces the traveller to make a detour and so gets unmerited notice because of its novelty in the widespread monotony. Sometimes the skeleton of a mule or horse becomes a monument to mark the otherwise blind trail. Occasionally the traveller enters a belt of *médanos*, crescent shaped sand-dunes, looking like small detached fortifications of which the material is always afloat in the wind, travelling to leeward in eternal migration. In the early morning air, you hear in this desert a peculiar minor music; if there were trees at hand, you might think it the sighing of the wind in the branches; then you note flying glassy particles, that roll up the slopes of the *médanos* and think, in this attrition you have found the source of the mournful cadence, that seems to fill the whole surrounding atmosphere. Profanity of science! Be still and listen! it is one of the sad *haravis* of the sierra; the spirits of departed Incas are chanting solemn dirges over the lost children of the sun!

But once in five to seven years there comes a marvellous change over all this scene. A shower, sometimes two or three, wanders away from the mountains and is poured over the arid land; then what wealth of beauty leaps under the wand of nature! the hitherto lifeless earth springs into being; grass and flowering plants appear on every hand, grown to the height of a horse's head. The bright yellow leaf of the Amancaes (ismene amancaes); the red petals of the papita of San Juan (begonia grandiflora) contrasting with the white inner sides; valerians, the beautiful bomarea ovata, innumerable species of oxalis, solanum and crucifers; amaranths that live on the nourishment drawn by their long penetrating roots, have been waiting all this time to give the world the beauty of their bloom; martynia and aniseia; algarroba (prosopis horrida) a stunted honey locust; vicaya (capparis crotonoides); the sapote* del perro or dog sapote so called because the hungry dogs of the town roam in the pampas in search of this savory fruit (colicodendron scabridum) and gigantic cacti.

Whence comes all this brilliant life? How has it slept in the

* According to Pichardo (*Diccionario de Voces Cubanas*) *sapote* is correct, but the Spanish dictionaries give *zapote*.—(Ed. BULLETIN.)

ground during these years? It lasts a week and has been known to live nearly a month; cattle and great herds of goats wander out of the inundated valleys across the living field and revel in the boundless joy. When they return we know the beauty is departing and death is settling on the scene; in this short space of time the souls of these beings have ripened for the resurrection to which they will spring in another cycle of seven years.

As illustrating the value of the wonderful vegetation of the Coast desert after the septennial rains, and also the ability of the Peruvian to turn his circumstances to account, I may tell you the story of the Tambo of Congará. It was thirty years ago, before there was a railroad in the department of Piura. An enterprising cholo built a tambo—an inn—in the middle of the desert, half way between the capital of the Department and the port. The fellow had to transport every stick and tool from a distance of seven leagues. His work was regarded as a blessing by everybody having to journey that road, and they were many. He supplied them with meals at reasonable prices and every quart of water as well as every pound of food was brought from the port, seven leagues away.

When he got well established, the owner of an hacienda, Macacará, on the Rio Chira, made his appearance and demanded rent for the little bit of desert land that was supposed to be without other owner than the government. After investigation the rent was paid because the claimant had a grant from the Spanish crown, by which it was shown that the hacienda, Macacará, extended towards the foot-hills of the Andes as far as the goats would go before they returned to the river for water. And it was known that in the fruitful septennial year the goats of Macacará went far beyond Congará, before they returned to the Rio Chira.

In this connection it will be interesting to note the fact, that seems to have escaped the attention of the historian, which is, that Pizarro began his conquest of Peru in a wet year, of which the evidence is complete. It rains on the northern coast of Peru only once in seven years. All the remaining years are utterly dry. Pizarro could not have gone from the Tumbez, where he first landed after his fight with the Indians at Puna, to the valley of Tangarará and found feed for his animals, nor would he have found the little settlements mentioned as existing along the road in any other season than a wet one.

Again, he would not have been driven from the Chira Valley, Tangarará, by malarial fevers, save in a wet year, as it exists in

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that valley only in wet years; and, third, he is said by Prescott to have "crossed the waters of the Piura River in September," when he started out on his conquering tour against Atahualpa. But only in a year of rain, which falls in February and March, is there any water in the Piura River after the month of June. In wet years it remains till the month of November, and has even been known to remain the whole year round, when in February of every year a lesser flood comes down. Had Pizarro attempted the conquest of Peru the previous year, when for the first time he reached the bay of Paita, he would have been defeated by the aridity of the desert. Only that one year, in the middle of fourteen, was adapted to his success. Was it Providence or luck? The pious Catholic has no difficulty in deciding.

The waters of the Pacific Ocean along this coast teem with excellent fish, of which the corbina, not known in the northern temperate zone, weighs from six to twelve pounds and is of rare delicacy; skate, sole, plaice, cod, haddock, flounders, smelts and Spanish mackerel abound in the sea, while in the streams are found shrimps and prawns, these latter of enormous size, weighing not unfrequently a pound and of exquisite flavor. Lobsters are found along the shores of the bays.

The desert of the coast affords life to the iguana, an enormous lizard and numerous smaller ones; also to rabbits, foxes and jack-rabbits; here also are vultures and condors; owls and bats; in the lower valleys the vampire bat and game birds abound, the partridge, pigeons, parrots, cuaresmeros (a kind of ruff). The singing birds are numerous and of beautiful plumage. In the valley of the Chira a superb oriole is the chiroca, named from his habitation in that valley; a fine nightingale called the ruiseñor, paroquets and a variety of small birds that fill the air with song and beauty. Domestic fowl abound and the world owes to Peru that prince of the dinner feast, the turkey. All the domestic animals, that are used in civilized parts of the world, have found their way to the Pacific coast. There still exist in the mountain districts the llamas, left to us from the times of the Incas and the only beast of burden indigenous to the country or known to its people before the Conquest.

The discovery of new and natural sources of wealth in Peru is an unending wonder. From that day in 1531 when Pizarro entered the bay of Paita, welcomed with gifts of flowers and fruit, whose brilliancy and lusciousness had been as yet unknown outside the Inca world, and the visit ashore, where the gentle-mannered sub-

jects of the "religion of Divine Light" offered him the sparkling chicha in golden goblets, that delightful land has presented the world an illuminated procession of revelation extending along nearly four centuries of its modern history. The Spaniard had passed but a single day and night in the beautiful bay when he gave to his poetry the lovely image of "el Sol de Colan y la Luna de Paita" (the sun of Colan and the moon of Paita), in itself a story of heavenly beauty and delicious climate.

But when to ransom Atahualpa, their adored Inca, the Peruvians filled a great apartment of Cajamarca, with gold as high as a man could reach, and the conquerors followed this first shipment with invoices of precious stones and metals, with the potato, the turkey and maize; with alpaca wool and vicuña, Peru became a prey to all the greed of Spain, and even since acknowledging the independence of the republic she has attempted to recapture the country.

One of the northern valleys, the Piura, now claims attention, because of the production of an extraordinary class of cotton. This article had not been thought of value for exportation until within the last three years, during which time it has become of demand in England, far exceeding the supply, and is now attracting the attention of manufacturers of fine underwear and hosiery. It grows in various colors, of which there are now produced twelve shades, ranging from a beautifully pure white, through a delicate buff, two or three shades of pink, a light brown, up to a rich, dark, red brown.

It is in use by the English manufacturers to adulterate fine woollens. Hitherto its use has been confined to Peru for the manufacture of coarse ponchos and the striped saddle-bags of the country.

The lands of the Piura lie four to five degrees south of the equator and once in seven years are visited by floods that wet a narrow belt along the banks, whereby some 1600 acres are made available for cultivation, all of which is now appropriated to cotton. This one wetting gives five crops, two per year, and then the land rests to finish the cycle of seven years and then another procession of five crops.

As already said, the waters of the Piura River continue in sight in the floods of rainy years till October, and often later. In other years they disappear in the sands in June and the people who live in the valley begin then to sink wells in the river bottom for their daily supply. This disappearance of the river is so gradual it is not possible to designate the day when it takes place; not so its arrival in February or March, when the bed of the stream has been

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dry for months and occupied for truck gardens. Then the people have become thirsty for the river. Every traveller from up the valley is questioned as to where the river was when he passed. If he report that it is coming a crowd of eager listeners and questioners surround him as if he had brought the important news of a foreign loan commission, and naturally enough, for the condition of the river, whether it contain much or little water, is the prophecy of the year's crops. At last, generally about the end of February, one hears that the river is twenty leagues away and coming; a few days later it is only ten leagues distant, and as it passes the upper haciendas, the Indians turn out and welcome it with drum and fife and fire rockets.

Sometimes there comes a disappointment; for when it seems a sure thing and the people of the City of Piura in the lower valley have begun to look for it, the river will have ceased to flow; it sinks away in the sands and they say "the river has gone back." This, however, will last but a few days. Again it comes and we hear in Piura that "the river is but a league away and will be here to-day." Then every horse and saddle is brought out and the people leave the city to meet the messenger of glad tidings, of health and riches to the arid land.

In all the year there is not in the north of Peru a feast to equal this. No fatigue is felt by the multitude, who travel through the heavy sand; some on foot, some on donkeys that carry two or three men and women with a small family of half-grown children; others again are mounted on mules and then the élite on horses.

All are glad!

When you meet the river it is a little trickling streamlet running here and there in search of the lowest places; it stops to fill the wells in its way that were excavated last season and then runs forward, the same little rill. A short distance farther up the valley, from which it has come, you will find it a respectable stream, where the boys and dogs run into it and lie down and revel, and in a little time can swim. It is for everybody a season of real joy, and with many a carnival of frolic.

The spectacle of its approach witnessed from the bridge of Piura is a wonderful sight. First, you discover the pioneers of the marching host come slowly around the bend of the river at the upper edge of the town, followed shortly by the surging army of thousands of people; you hear the music of the band, the murmur of five thousand distant human voices and the din of rockets, which throw a smoking line along the air.

The river has come!

I saw it reach the bridge in the early evening and the band played while the people danced on and under the bridge all night long, or as long as the increasing flood permitted. If five thousand turned out to escort the river to Piura, it was met by fifteen thousand or more at Catacaos, an Indian city six miles lower down the valley. And so the River Piura has a triumphal march from the mountains to the ocean at Sechura, where, sadly enough, all this wealth and glory are cast into the sea and pass away forever.

Two thousand million cubic metres per year are thus lost of a treasure worth more to a people than any guano or nitrate deposits, because it represents the source of life to the common people, who have only to stretch forth their hands in honest industry and secure its bounties.

A concession has been given to an American engineer, who devised a system of irrigation for this valley several years ago, for the purpose of developing the wealth, which has been slumbering ever since the Incas were dethroned.

At the present time the cultivated area is so small that the demands of the market for the cotton of the Piura valley cannot be supplied. By the system proposed it is hoped to get more than a million acres of this fertile territory under improvement, when, not only cotton but sugar, coffee, cocoa, indigo and all the fruits and vegetables of the tropics can be grown as they were centuries ago, and American capital will thus make an opening for American influence among a people most friendly to our country and in a land accessible to our commerce.

Some years ago Mr. Samuel McElroy, an American civil engineer, made surveys of the Chimbote Pampas, a few miles south of Piura, for the purpose of devising a system of irrigation. His opinion was that the land was peculiarly adapted to cotton. The system has been constructed as he advised, by restoring an old canal of the aboriginal Incas. The singular fact is that while the universal judgment indicated the land for cotton, it has all been put into sugar and not a cotton plant is raised in the district. The sugar crop yields 9,000 pounds of sugar per acre per year. After the cane is once ready to cut you may pursue the cutting and sugar making every day in the year.

At the plantation known as La Puente, the most important of the region, having an appraised value of five million dollars, produced by a single irrigation canal of moderate cost from an arid desert of most unpromising complexion, there had been erected

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one of the two most extensive sugar manufactories in the world, being the twin of the Lurifico mill, to which I have already referred.

This magnificent establishment was brutally destroyed during the Chilian war by Admiral Lynch, in command of the Chilian Navy. The Lurifico affair was prudently spared as being the property of an American citizen.

The appearance of a Peruvian cotton field may well astonish an American planter, for in the five years of its growth the plant often reaches the height of twenty feet, and in the weeks of ripening has all the beauty of an immense sunlit snowdrift.

The Peruvian "tree-cotton," of which a good deal has been written, is really only an accident. The trees are from seeds deposited in some wet place during an exceptionally high flood and left without attention during succeeding years. But where the supply of water permits, the crop is replanted every seven years, the second, third and fourth crops being the finest and most abundant of each planting. There are low spots where veritable cotton orchards are found of which the trees are forty years old. But they receive no attention, save when an extraordinary flood happens to give them a spasmodic vigour of life for a year or two.

As the American sea-island cotton is chiefly used for admixture with silk, so the cotton of Peru, and especially that of the Piura valley, is almost entirely devoted to the adulteration of fine woollen goods, to which it adds strength, lustre and protection against shrinking. Its value fluctuates accordingly, in the market with wool and not with cotton, of which it is quite independent. It is at all times vastly more costly than any other cotton except the American sea-island. It permits the manufacture of a stylish underwear in many various colors and of real sanitary quality since it contains no poisonous dyes, but ripening in the sunshine is also proof against fading.

The story that there exists in Piura a fertile country in which the ordinary labor of cultivation is avoided by the absence of weeds sounds like a fable. It is nevertheless true, as you may readily understand; when the water of the septennial floods recedes from the river bank the weeds grow in grand luxuriance. Meantime the planter has by a shovel sunk holes a depth of two feet wherever he wishes to plant seed. He plants nothing near the surface of the ground, but drops his seed into these holes and by the time the plant reaches the surface, the weeds which had covered the earth have been burned up by the heat of the sun.

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The plant, however, has its root well down in the damp earth below the influence of the sun's rays, and as it grows and spreads the more effectually the hole and the root in it are shaded.

The use of oxen is not known in the Department of Piura, nor is any system of ploughing. I should think, however, that all this must come with irrigation.

Some wealthy planters in the valley have introduced English pumping engines, by which they are raising cotton at an expense for irrigating of twelve dollars per acre per annum, with the full understanding that when the proposed system comes among them it can be done for three dollars.

The Concession lately given by the government of Peru offers the first complete opportunity for the employment of American capital and influence in a great public work that has ever yet been presented by this republic. It is especially valuable because it is offered in a cordial spirit and relates to a Department known throughout the South Pacific Coast country as the sanitarium of the continent. The Department contains a population of 150,000 souls, of which 60,000 are in the Piura valley in the section to be irrigated under this concession. This population is largely indigenous and is a gentle race, more virtuous than either the mixed or whites. A late annual report of the Prefect of Piura to the national government, while deprecating that marriages in the Department are not in relation to the increase of population, declares that the Indians marry more than the mestizoes and these more than the whites. As to negroes, which, throughout Spanish America are unhappily the most vicious of the people, they embrace only about one in a thousand of the population of the Department of Piura. Declaring that the illegitimate births are alarmingly in excess of the legitimate, the prefect thinks the exorbitance of parochial charges for solemnizing marriage is a prominent cause of vice among the people.

The Department of Piura possesses in the mineral kingdom, gold, silver, lead, copper, iron, sulphur, coal and petroleum. It also has a great abundance of mineral waters, asphaltum, carbonate and sulphate of lime, salt, alum, nitrates and potter's clay. In the vegetable kingdom it produces cotton, sugar, cascarilla, tobacco, cacao, sarsaparilla, tamarinds, gums, coffee, corn, rice, cherries, all classes of tropical fruits, with vegetables.

There are at present in active operation in the Department of Piura 561 petroleum claims, which are supplying a considerable part of the Pacific Coast market, and are making arrangements for

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possessing themselves of the Chinese and Japanese markets to which they are nearer than the American manufacturer. At the present time they are turning out 250,000 gallons of refined kerosene per day. Partially refined petroleum is being used in steam boilers and for locomotive fuel on the railroads of the coast. A tank steamer now makes regular trips between San Francisco and Talara, transporting crude petroleum for fuel in California. This grand success has been accomplished for the country by means of a protective tariff, which permitted the manufacturer to perfect the system of refinement.

And concerning this protection by means of a prohibitive tariff, being 40 cents on an appraised value of 30 cents per gallon, it is well for the American to observe that is asked by and granted to English saints, who find that under certain circumstances the doctrine of free trade is not altogether orthodox.

There are also at work in the same Department seven gold mines, two deposits of asphaltum, ten of asphaltum and petroleum in mixture, seven sulphur mines, and three coal mines.

In Catacaos, an Indian city six miles below Piura in the same valley, is a famous manufacturing industry of coarse cotton fabrics (hand woven)—for ponchos and saddle-bags and also of Panama "straw" hats, which are not in any sense "straw" as we understand it, but are made of a soft, green marsh reed. The cotton fabric of the saddle-bags has already been described and its culture; the hats are by all odds the most important branch of manufacture in the republic, if we except the sugar industry, amounting in value to $800,000 a year. Like the weaving, they are the resources of the people when they are waiting for the coming of the river. The merchants of the South Pacific Coast are able to designate the place where a hat is made by the characteristic of plaiting, just as one may locate the nationality of a man by his chirography. Ordinary hats, such as sell in the United States for five dollars, can be bought in Catacaos for fifty cents. But I have seen fine hats sold for one hundred dollars American gold, which are sold in Europe and Cuba for five hundred dollars. These beautiful things are built by contract and occupy the moonlit nights of three months. You will have no difficulty in understanding why the maker must avoid the insect attraction of the lamp and candle and the drying effect of the sunshine upon the delicate reed of which the hat is made. Such hats are like silk; I have heard of one in the possession of the Prince of Wales that he can fold and carry in his vest pocket without injuring its form or texture.

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The most important problem now pressing on the Peruvian mind in consideration of the demands of the Coast Desert is that of irrigation. General laws have lately been passed authorizing the President to enter into contracts with parties willing to undertake such works.

The law makes all the lands, accessible to the waters of irrigation liable as security for water rents; it also makes it obligatory on all such land to pay the rent, whether it avail of the use of the water or not. The rents are a lien upon the crops as well as upon the land. When a rent has not been paid for two terms of six months each the irrigating company gets the land by a system of appraisement extremely just—*i. e.*, the annual average value of its productions is to be reckoned six per cent. of the real value. As the land is a desert, producing nothing, this value is nominal. The manner of appraisement is also just, for the manager of the company is one of the commissioners to settle values, and the other is a nominee of the land-owners, there being only two. If these two fail to agree, the case is to be settled by the manager of the company and the engineer of the government, an educated, disinterested gentleman.

The Peruvian government and the land-owners in the valley of the river Piura, as well as in the full extent of the Coast Desert, have thus shown an earnest wish to put their magnificent territory in position for its best development, while allowing the enterprising men, who are willing to invest their money in the country, a good opportunity for extraordinary profit.

It is proposed for the Piura system to build a low dam in the first instance that shall provide water by economizing the floods that come down the stream every February, and instead of allowing it to flow on in waste to the sea as at present, intercept its course, turning it aside and using in its passage to irrigate the pampas to the extent of 80,000 acres, or sufficient to furnish all the population at present there existing, with the land they now require and are capable of cultivating. This work is estimated to cost something less than $200,000, and will give an income, paying enormous dividends on the outlay, besides furnishing means of pushing the works to their ultimate completion.

Nor can this claim be reckoned extravagant when it is remembered that the return on irrigation works in the United States arid regions is 219 per cent. on the outlay, and that none of these are on land yielding an equivalent of the valuable Peruvian cotton, with two crops a year and selling at a higher price than any other cotton in the world, save always the American sea-island.

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INDIAN TERRITORY.

BY

HENRY GANNETT.

Almost in the middle of the United States, in the heart of a region thoroughly well known, densely peopled and well organized, is a large tract of country which is practically unexplored, is without civil organization or government except such as is afforded by the tribes which own it, and in which most of the elements of civilization are extremely primitive. This is Indian Territory.

The Indian Territory was never made in the sense of being planned out as a political organization. It is simply a remain. Its area was assigned by the United States to certain Indian tribes before Texas became a part of the United States, when our boundary with Mexico ran along the Red River and the 100th Meridian, which were the south and west boundaries of Indian Territory and Oklahoma. Arkansas was cut off on the east to form a State, and to this country west thereof were transported from the Cotton States the Cherokees, Creeks, Choctaws, Chickasaws and Seminoles. This transfer began in 1832 and was concluded, so far as these Indians were concerned, in 1846. The present Indian Territory comprises their reservations, together with some petty reservations of small tribes in the northeast corner of the Territory. With the exception of these little reservations it is divided among what are known as the Five Civilized Tribes, the following area belonging to each:

Cherokees	7,700 square miles.
Chickasaws	7,250 square miles.
Choctaws	10,300 square miles.
Creeks	4,700 square miles.
Seminoles	550 square miles.

Of these reservations the Chickasaw Nation has been subdivided by the U. S. General Land Office, and good maps of the drainage of the country have been prepared; but little, however, is known of its relief. Of the rest of the Territory little is known, either of drainage or relief. The only information which we have has been picked up from the explorations of two or three Army expeditions, made half a century ago, and from the surveys attendant upon the construction of the half dozen railroads which traverse it. As may

be easily believed, the sum total of this information is scanty and by no means reliable.

The different parts of the Territory differ greatly in their topography, climate and vegetation. South of the Canadian River, in the portions of the Territory comprising the reservations of the Choctaw and Chickasaw Nations, the country is somewhat broken, being traversed by the crooked, serpentine ridges constituting the southern portion of the Ozark Hills. These hills enter the Territory from Arkansas, and near the Arkansas boundary are quite high, the summits reaching an altitude of 2,500 feet above sea level. Westward they diminish in height rapidly, and in the central part of the Choctaw Nation, few of them exceed 1,000 feet above the general level of the country. They are mainly quartzite ridges, the intervening valleys being floored with limestone, the difference in lithology explaining the topography. It is a survival of the hardest.

North of the Arkansas and Canadian rivers the surface differs greatly from that to the southward. The so-called Boston Mountains extend over into the Territory from Arkansas for a short distance. This is a plateau, deeply scored by streams. West of this broken region the country is broadly undulating.

The eastern portion of the Territory, especially the mountainous and hilly part, is forested. The Chickasaw country and the western portion of the Choctaw country is an alternation of timber and prairie, the timber predominating to the extent of two-thirds or three-fourths of the area. Through the Seminole country and the western portion of the Creek and Cherokee countries extend the Cross Timbers, which from southern Kansas far down into Texas form a well-known timber belt, consisting mainly of black-jack and post-oak. East of it, in Kansas and the Cherokee and Creek Nations, is an open prairie, there being no timber excepting the belts which accompany the streams.

The Territory contains probably a quarter of a million of people, of which over 50,000 contain more or less Indian blood, few of them, however, being full-blooded Indians. Associated with these are 18,000 or 19,000 persons of negro descent. In order to obtain membership in the tribes and thus enjoy the advantages which accompany it, many white men have gone to the Territory and have married Indian women. While these are comparatively few in number, their wealth and power render them a very important element. By far the largest element, numerically, of the population, however, are whites who are not connected by marriage with the tribes, but

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who are living in the Territory under some form of permit from the tribes. These numbered in 1890, according to the Census, over 100,000, and it would not be a matter of surprise if there were double that number in the Territory at present, as they have been flocking in rapidly in recent years.

The form of the government of the tribes is quite similar to that of States. They elect a Governor and other executive officers, a legislature consisting of two houses, and they have a judiciary, with the other machinery of the law. The government, however, is very feeble, especially in matters affecting the white residents of the Territory, and most of the administration of law is carried on by the United States authorities.

In accordance with the treaties made with the United States, the lands of these tribes are held in common. They cannot be disposed of by the tribes to any party except the United States. Under their laws, any member of the tribe may take up and use any unoccupied land which he desires. This holding, however, is subject to the will of the tribe, which retains ownership of the land. In this way the Indians have located themselves mainly upon little farms, away from the railroads and white settlements. The whites who have become members of the tribe by intermarriage, on the contrary, with their wide-awake Anglo-Saxon enterprise, have seized upon the cream of the country. They hold the town sites, the coal lands and the finest of the agricultural and grazing lands. Most of these lands they have rented to other white men, paying a small portion of the rental to the nation. Thus we have before us a practical illustration of the workings of Henry George's theory of holding land in common, and it can scarcely be said to be a success. The number of land-grabbers being limited, land-grabbing has gone to a far greater extreme than in any other part of the country. For instance, it is said that the entire reservation of the Seminoles is in the hands of one man, the chief, and that the Indians are practically serfs, and the same is the case in less degree in other nations. Another evil follows closely upon this: owing to the extreme uncertainty of all land titles, or rather to the utter absence of them, few settlers dare to make more than the most temporary sort of improvements. Most of the buildings in the towns are of the most flimsy, temporary character. The policy, naturally, is to skim the cream as quickly as possible and throw away the skimmed milk to sour.

With the large number of whites in the Territory not connected with the tribes, but dependent for their leases, and for the improve-

ments they have made, upon the will of the Indians, it will be surprising if the present condition of things lasts much longer. As their numbers increase relative to the Indian population, they will certainly take possession of the civil authority sooner or later, and of their holdings. Such a revolution seems near at hand. It can probably be effected without material trouble, since the Indian population will be greatly outnumbered.

Foreseeing this possible result, the United States has been, for some time past, attempting to negotiate with these Indians with a view of giving up the tribal governments, divide their lands in severalty, and thus make it possible for the whites to obtain deeds to whatever land the Indians do not actually require. A Commission is at present in the Territory attempting to treat with the Indians, but the latter, influenced probably by the whites who are members of the tribe, and who have every reason to be satisfied with the present arrangement, refuse to treat with them in any way. Indeed, under the circumstances it seems to be a very difficult situation. The only easy solution would seem to be to give every one connected with the tribe whatever he claims, which would result naturally enough, in giving the Indians proper very little and the white men who have married into the tribes the lion's share. On that basis, it is altogether probable that there will be no trouble in coming to an understanding and agreement with the Indians, owing to the influence which these white men among them have over them.

As a preliminary to the allotment of lands among the Indians the United States Government has commenced the subdivision of these lands into townships, sections and quarter-sections. An appropriation of $200,000 was made by the last Congress for this purpose, being the amount estimated to be necessary for subdividing half of the Territory, with the exception of the Chickasaw Nation, which has already been subdivided. This work was, under the appropriation act, placed in the hands of the Director of the U. S. Geological Survey, to be executed by the Topographic force connected with this Bureau. The work was commenced in April, 1895, and is being rapidly pushed forward, and by the end of the year 1896, providing Congress continues to support it, the subdivision of the Territory will be completed.

As there are some features distinguishing this work, as executed by the U. S. Geological Survey, which differ from the ordinary work of the subdivision of lands by the General Land Office, a few details regarding it will be of interest.

The base line of this work is a continuation of the Indian base which is run across the Chickasaw Nation. The principal meridian corresponds with the east line of Range 8 of the system of surveys. Standard parallels are run at every twenty-four miles north and south of the base line, and guide meridians are run every twenty-four miles east of the principal meridian Township exteriors, and subdivision lines of the townships are run according to the ordinary practice of the Land Office, as prescribed in its Manual. These features are common in all public land surveys, but the distinctive features are as follows: A base line has been measured near Savanna, in the Choctaw Nation, an expansion effected and triangulation extended therefrom over the country in advance of the work of subdivision. With the stations in this triangulation the township and section corners have been connected by angular measurements from the corners. The result of this is to have the whole system of subdivision lines controlled by a primary triangulation, by means of which errors become known and can be corrected, if of such magnitude as to require correction, and if otherwise allowance can be made for them. Moreover, in case the marks of any corner should be lost or destroyed the corner can be recovered from the nearest station in the primary triangulation, since these points are marked in the most permanent manner.

Another feature is, that as the work of subdivision goes on topographic maps are prepared. These maps are made upon a field scale of two inches to one mile, and show the drainage, roads, settlements and even isolated houses. They show the relief of the surface by means of contour lines at intervals of twenty feet. The extent of marsh land, of wooded and prairie regions are shown in detail, thus furnishing much valuable information regarding the country for the immediate use of all parties interested in the allotment, including the Government on the one hand and the Indians upon the other. Besides this immediate use, of course the maps will be of the utmost service for all future improvements which depend upon the surface of the country.

The work of extending primary triangulation and of preparing these maps forms but a trifling addition to the cost of making the subdivisional surveys.

GEOGRAPHICAL NOTES.

BY

GEO. C. HURLBUT, *Librarian.*

THE POPULATION OF THE UNITED STATES.—The Census Office has just issued the *Report on the Population of the United States at the Eleventh Census, 1890, Part 1.*

The area of the country (exclusive of Alaska) is 3,025,600 square miles, and the total population (excluding the inhabitants of Alaska, the Indian Territory and the Indian reservations) was, on the 1st of June, 1890, 62,622,250. The following table gives a view of the progress since the year 1790:

YEAR.	POPULATION.	AREA SQUARE MILES.
1790	3,929,214	827,844
1800	5,308,483	827,844
1810	7,239,881	1,999,775
1820	9,633,822	1,999,775
1830	12,866,020	2,059,043
1840	17,069,453	2,059,043
1850	23,191,876	2,980,959
1860	31,443,321	3,025,600
1870	38,558,371	3,025,600
1880	50,155,783	3,025,600
1890	62,622,250	3,025,600

In computing the density of the population, the land surface only has been taken, and Alaska and the Indian Territory have not been considered. With these restrictions the density was: In 1790, 4.89; in 1800, 6.61; in 1810, 3.69; in 1820, 4.91; in 1830, 6.35; in 1840, 8.43; in 1850, 7.93; in 1860, 10.84; in 1870, 13.30; in 1880, 17.29; in 1890, 21.31.

The most densely peopled States, for ninety years, have been Rhode Island and Massachusetts. In 1890 the former had 318.44 inhabitants to the square mile, and the latter 278.48.

The District of Columbia, with a population of 3,839.87 to the square mile, is in fact a municipality.

The white inhabitants of the country numbered, in 1890, 54,983,890. Of these 34,464,247 were of native, and 20,519,643 of foreign, parentage.

The coloured population numbered: *Negroes, 7,470,040; Chinese, 107,475; Japanese, 2,039; civilised Indians, 58,806.

According to the census of 1870, which is declared to be untrustworthy, there were 14,528 negroes to 100,000 whites. In 1880 the proportion was 15,162 to 100,000, and in 1890 13,586 to 100,000. The percentages of the two races at each census were:

YEAR.	WHITE.	NEGRO.
1790	80.73	19.27
1800	81.12	18.88
1810	80.97	19.03
1820	81.61	18.39
1830	81.90	18.10
1840	83.16	16.84
1850	84.31	15.69
1860	85.62	14.13
1870	87.11	12.66
1880	86.54	13.12
1890	87.80	11.93

Of the 20,519,643 persons of foreign parentage (one parent, or both, being of foreign birth) there were:

Irish, 4,913,238; Germans, 6,851,564; English, 1,922,638; Scotch, 540,779; Welsh, 220,540; Canadian English, 939,746; Canadian French, 513,428; Swedes, 726,430; Norwegians, 596,131; Danes, 213,036; Bohemians, 215,514; French, 255,488; Hungarians, 71,519; Italians, 248,601; Russians, 254,635, and of other nationalities, 1,114,088.

Alaska, for some unknown reason, is always pushed out of sight like a poor relation. Its area is set down at nearly 600,000 square miles, with a total population of 32,052. Of these 4,298 were white, 23,531 Indians, 2,288 Mongolians, 1,823 of mixed origin, and 112 classified as "all others."

The whole number of Indians in the United States is 271,784, divided into three categories, as follows:

Civilised Indians (included in census)	58,806
Alaska Indians (excluded from census)	23,531
Indians of Indian Territory and the Reservations (excluded from census)	189,447
	271,784

* This word, in the Census returns, includes all, wholly or in part, of negro blood.

In the *Report on Statistics of Churches in the United States at the Eleventh Census, 1890*, also just issued, Table 9 gives the following summary of denominations:

Adventists, 60,491; Baptists, 3,712,468; Brethren (River), 3,427; Brethren (Plymouth), 6,661; Catholics, 6,257,871; Catholic Apostolic, 1,394; Christadelphians, 1,277; Christians, 103,722; Christian Missionary Association, 754; Christian Scientists, 8,724; Christian Union, 18,214; Church of God (Winebrennerian), 22,511; Church Triumphant (Schweinfurth), 384; Church of the New Jerusalem, 7,095; Communistic Societies, 4,049; Congregationalists, 512,771; Disciples of Christ, 641,051; Dunkards, 73,795; Evangelical Association, 133,313; Friends, 107,208; Friends of the Temple, 340; German Evangelical Protestant, 36,156; German Evangelical Synod, 187,432; Jewish Congregations, 130,496; Latter-Day Saints, 166,125; Lutherans, 1,231,072; Mennonites, 41,541; Methodists, 4,589,284; Moravians, 11,781; Presbyterians, 1,278,332; Protestant Episcopal, 540,509; Reformed, 309,458; Salvation Army, 8,742; Schwenkfeldians, 306; Social Brethren, 913; Society for Ethical Culture, 1,064; Spiritualists, 45,030; Theosophical Society, 695; United Brethren, 225,281; Unitarians, 67,749; Universalists, 49,174; independent congregations, 14,126.

The figures represent the communicants or members.

The total number of organizations in the country (including Alaska) is 165,177, with 142,521 church edifices and 23,334 halls, including 47 Chinese temples and 1 hall. The total value of church property was $679,630,139.

The way of the census agent, like that of the transgressor, is hard, and the Introduction presents some of the objections offered by conscientious believers who were asked to supply information. The agent was reminded in several instances that David sinned in numbering Israel, and that punishment came upon him. The Dunkards passed a solemn and ungrammatical resolution against taking part in the matter. A representative of another body referred to the words of Jesus: *My sheep hear my voice and I know them and they follow me;* and added: "He knows His sheep, but me or you don't."

A minister wrote that he belonged to the church of the first born who are written in Heaven, where the class-book, the family register, was kept, and that, having no example from either Christ or the Apostles, his people kept no registry or enrolment.

THE REMOVAL OF PROF. DAVIDSON.—In the early summer of

1895, Prof. George Davidson, one of the most efficient among the many distinguished scientific men who have given character and renown to the United States Coast and Geodetic Survey, was removed from his position at the head of the Survey on the Pacific Coast.

This arbitrary action, unhappily not singular, on the part of the Secretary of the Treasury, roused the public indignation, which expressed itself in the following memorial, laid before the President by the Geographical Society of the Pacific:

To His Excellency Grover Cleveland, President of the United States:

Among the removals from the United States Coast and Geodetic Survey, just announced, is that of Professor George Davidson, for many years in charge of the Survey on the Pacific Coast.

The Geographical Society of the Pacific desires to enter a respectful protest against this removal. Professor Davidson is physically far more active than his years would lead those not acquainted with him to suppose. He is amply able to do duty in the field to-day, and his long experience and well-earned reputation in scientific circles render his services exceptionally valuable to the Coast Survey. Thoroughly familiar with the routine, he is fully qualified to carry on what yet remains to be done along this coast.

We consider it a grave mistake to remove him. One who could devote night after night to taking stellar observations for the United States Government in a cold, damp observatory, from 9 P.M. to 3 and 4 A.M., keeping this up for periods of sixty and seventy consecutive nights, and transact the daily office business of the Survey besides, as the Professor has frequently done within the past three years, can scarcely be called too old for duty. Many men who are twenty years younger than he is could not go through such a physical strain. In reducing the appropriation for his department Congress did not intend to dispense with his services.

As a recognition of his work for the advancement of science the Royal Geographical Society of London elected him an honorary member of their organization. In 1894 the French Government appointed him a corresponding member of the "Bureau des Longitudes" of Paris. This honor has never before been conferred upon an officer of the United States Government. In both instances the action was a compliment to the American people.

And this Society does, therefore, with a view to the benefit of the public service, respectfully ask that your Excellency take such action as may be necessary to restore Professor Davidson to his former position.

RALPH C. HARRISON,
IRVING M. SCOTT,
CHAS. L. TAYLOR.

JOHN PARTRIDGE, *Secretary.*

PRECIPITATION IN THE UNITED STATES IN 1893.—The Report of the Chief of the Weather Bureau for 1893, just issued, contains a tabulated statement of the precipitation, monthly and annual, so far as recorded at the stations throughout the country. In many instances the returns are fragmentary, and these have not been

taken into account in the preparation of the following list of averages:

STATE.	NO. OF STATIONS.	AVERAGE. PRECIPITATION.
Alabama	35	50.82 inches.
(Mobile, 63.42 in.)		
Alaska	2	87.47 "
Arizona	37	11.78 "
Arkansas	35	47.38 "
California	281	21.01 "
(San Francisco, 17.91.)		
Colorado	70	12.23 "
(Denver, 8.48.)		
Connecticut	21	49.31 "
Delaware	3	41.68 "
District of Columbia	4	36.04 "
(Washington, 36.71.)		
Florida	31	53.51 "
Georgia	40	44.04 "
(Savannah, 61.58.)		
Idaho	8	19.98 "
Illinois	44	33.05 "
(Chicago, 27.47.)		
Indiana	35	42.92 "
Indian Territory	5	31.50 "
Iowa	65	27.47 "
Kansas	59	19.11 "
Kentucky	27	39.86 "
Louisiana	34	49.80 "
(New Orleans, 48.02.)		
Maine	10	40.72 "
(Portland, 43.61.)		
Maryland	13	41.07 "
(Baltimore, 32.15.)		
Massachusetts	67	44.85 "
(Boston, 41.84.)		
Michigan	55	34.86 "
(Detroit, 34.18.)		
Minnesota	42	25.65 "
(St. Paul, 25.95.)		
Mississippi	25	50.36 "
Missouri	68	38.70 "
(St. Louis, 39.33.)		
Montana	14	13.88 "
Nebraska	50	18.87 "

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STATE.	NO. OF STATIONS.	AVERAGE PRECIPITATION.
Nevada	35	9.25 inches.
New Hampshire	21	38.21 "
New Jersey	49	47.78 "
New Mexico	19	12.19 "
New York	57	42.76 "
(New York City, 53.01.)		
(Buffalo, 38.64.)		
North Carolina	38	52.60 "
(Asheville, 46.90.)		
North Dakota	21	16.43 "
Ohio	90	39.52 "
(Cincinnati, 44.00.)		
Oklahoma	9	22.33 "
Oregon	53	41.96 "
Pennsylvania	70	44.02 "
(Philadelphia, 37.65.)		
Another observer makes the Philadelphia record 45.23.		
Rhode Island	7	49.47 "
South Carolina	20	53.21 "
(Charleston, 70.99.)		
South Dakota	33	18.48 "
Tennessee	29	47.26 "
Texas	58	19.42 "
(Galveston, 35.43.)		
Utah	24	11.46 "
(Salt Lake City, 17.35.)		
Vermont	12	37.79 "
Virginia	32	46.72 "
(Richmond, 46.04.)		
Washington	23	46.57 "
The heaviest precipitation in the United States is 118.88 inches at Neah Bay, Washington.		
West Virginia	22	40.65 "
Wisconsin	43	29.80 "
(Milwaukee, 32.87.)		
Wyoming	10	9.86 "

The Report closes with tables showing the loss of life by violent wind and by lightning for the four years, 1890–1893. The great losses occur in the months from March to September, inclusive, though 21 deaths were caused by wind in November, and 11 in December, 1892. The total of deaths by violent wind in the four years was 1,032, and 784 persons were killed by lightning.

THE MAZAMAS ENTERPRISE.*—The plan of sending a heliographic message from mountain to mountain, between British Columbia and Mexico, on the 10th of July, was partly executed by the Mazamas, and is reported at length in the Portland *Oregonian* of July 21. The operations were limited to six peaks—Mts. Hood, Jefferson and Diamond in Oregon, and Baker, Rainier and Adams in Washington.

The Mt. Baker party failed to reach the summit, and the Diamond Peak party had not sent in a report.

Mts. Rainier, Adams, Hood and Jefferson were successfully ascended, but the atmosphere was charged with smoke and the signals from Rainier and Jefferson were obscured. Communication between Mt. Hood and Mt. Adams was satisfactory for a considerable time, until both summits were hidden by the cloud of smoke, which rose to a height of more than 12,000 feet.

The instruments used were made in Portland, Oregon, after the army model, but with mirrors 6x6 in., instead of 4½x4½ in. The mountings were of aluminium.

One of the objects to be accomplished in the ascent of Mt. Adams was the measurement of its height. This is put at 9,570 feet in most atlases and books of reference.

Twelve boiling-point observations, taken at intervals of 15 minutes, were computed by Mr. Alciatore, of the U. S. Weather Bureau at Portland, and compared with those simultaneously taken in that city. Five separate calculations, with different formulas, gave the following results: 12,255, 12,258, 12,184, 11,966 and 11,952; the average being 12,123 feet.

RAIMONDI'S WORK IN PERU.—Prof. Courtenay DeKalb, of the School of Mines at Rolla, Missouri, in a letter to the New York *Nation*, of July 18, reviewed the life and work of Antonio Raimondi, a man not more remarkable for his amazing industry than for his absolutely unselfish devotion to the cause of science.

He was born at Milan in 1826 and began his career in Peru in 1849. He died in 1890, universally respected, and was interred with imposing obsequies.

In forty years he had laid broad and deep the foundations of a monumental work on the geography and geology, the mineralogy, botany, zoölogy and ethnology of Peru. He travelled in every part of the country, collecting specimens, making astronomical and barometrical observations and accumulating stores of information.

*See *Bulletin*, No. 2, 1895, p. 176.

XUM

Besides the valuable monographs and memoirs which he contributed to the transactions of societies in France and Italy, and 16 sheets of the map of Peru, Raimondi brought out the following books:

El Departamento de Ancachs, in 1873.

El Perú, Vols. 1, 2 and 3, in 1874–1879.

Minerales del Perú, in 1878.

The volume on Ancachs was published through the liberality of Henry Meiggs; the other works by the Peruvian Government. In 1886 the Government assumed the expense of editing, under Raimondi's supervision, and publishing the continuation of *El Perú*, but in the crippled condition of the country after the war with Chile nothing could be done. It was during the war that the Italian Government made an offer to Raimondi to supply him with all necessary scientific aid and collaboration, and to bear the entire expense of publishing his work, if he returned to Italy with his collections. This offer he declined, under a sense of moral obligation to his adopted country.

The collections have been examined by the Geographical Society of Lima.

They contain ample material for the completion of the geography, and folios describing 708 samples of rock, with many analyses, and 2,000 specimens of fossils. In mineralogy there are five folio volumes, with descriptions of 2,994 specimens.

In botany there are 149 folios, with 20,000 specimens, besides 160 full boxes, and seeds, barks, gums, etc., 500 in number, and many coloured sketches for illustration.

The zoölogical collection comprises 1,500 examples of birds, mammals, and reptiles, 4,000 insects and 500 mollusks, and there are 300 objects in the ethnological department.

According to the systematic plan for continuing the work, *El Perú*, when complete, would consist of twenty volumes.

Mr. DeKalb's letter ends with a question that should not be left without a reply:

> Rather than encourage some new enterprise, would it not be a more fitting thing for one or more of our great scientific associations to join hands with the Geographical Society of Lima and the Peruvian people, and secure for the good of the world the fruits of a great life-work, which only needs to receive the finishing touches to render it available? It would surely be an appropriate act of that universal brotherhood of science of which we are wont to hear so much, and which needs to be quickened ever and anon by such deeds of generosity.

The Dutreuil de Rhins Expedition.—M. Fernand Grenard, the companion of the ill-fated Dutreuil de Rhins, made a detailed

report of his mission at a meeting of the Paris Geographical Society, held on the 7th of June.

This report fills more than thirty pages of the *Comptes Rendus*, Nos. 11 et 12, 1895.

The explorers left Paris in February, 1891, organized their caravan at Osh, in Russian Turkistan, and started, May 23, on their long journey across Tibet and through China to Pekin.

They crossed the Alai Tagh, bare and desolate, especially on the Chinese slopes, and reached Kashgar, where they met the Russian Consul-General, Petrovsky, and the English travellers, Younghusband and Macartney. On the 7th of July they arrived at Khotan, where the real exploration began. Three campaigns were planned, each of a year in length; the first, to examine the mountains south of Khotan and Polur, and trace, if possible, the ancient road which led directly to Lassa; the second, to cross the mountains and push on to Lake Nam-tso and thence to Hsi-ning; the third, to traverse some districts of Mongolia and to end the journey at Pekin. With some modifications, this general plan was carried out.

Arrived at Polur, Dutreuil de Rhins spent some time searching in vain for a pass through the Altyn-Tagh, and was at last helped on his way by the Chinese sub-prefect of Keria. The party entered the Ustun-Tagh and followed the valley of the Aksu River, which flows between enormous masses of green and red rocks, with peaks covered with snow, as far as the Kukbuyang pass, 5,800 metres (19,029 feet) above the sea, the greatest elevation attained during the journey. From this pass they followed the Keria River till it turned to the north, when they struck off along the foot of the glaciers of the Ustun-Tagh. It was in September, but the altitude was above 16,000 feet, and the temperature, which reached 104° Fahr. at midday, went down to 4° below zero at night. Water was scarce and bad, and the provisions were poor. The men gave out and the horses began to die. There was no game; not even a bird passed in the sky. Worn-out and starved, the party returned to Khotan late in October.

The second year's work met with unexpected obstacles. The remittances of money were delayed, and the amount, when received, was insufficient, and M. Dutreuil de Rhins, remembering the rigour of the climate on the high plateaux, and wishing to avoid the winter, made his start in August, when the melting snows transform the uplands into bogs and marshes. The animals perished, and the day's march, which should have been thirteen miles, was not more than seven or eight. The route was to the south-west. At Lake

Sumji-tso the first Tibetan was met, and not far beyond, in a vast amphitheatre of mountains, a small encampment of his people. They were friendly, but very poor, and the travellers asked for a guide to lead them to some more fertile region. The guide was furnished, but he lost his way in two days, and the explorers, on comparing notes, found that their supply of provisions would just enable them to reach Ladak, the nearest point at which they could be sure of replenishing their stock. They arrived at Leh on the 2d of October, and started on the 20th to cross the Karakoram and return to Khotan, which was reached November 21.

The results of these two years were valuable collections in ethnography and in natural history, and a vast number of meteorological and hypsometrical observations, besides 1,377 astronomical determinations of longitude and latitude.

From Khotan the explorers moved to Tchertchen, about 300 miles to the north-east, and started on the 3d of September, 1893, on their third campaign, following a southerly course. On the 26th they crossed the Arka-Tagh and entered a wholly unknown region, a chaos of lofty mountains, without sign of vegetable or animal life. October 3, they passed a salt lake, 25 miles long, with shores and enclosing mountains of a lively brick-red; and on the 10th they came to an encampment of Tibetan hunters, in a country full of antelopes, wild asses and yaks. A few days later the caravan was overtaken by a snow-storm which lasted nearly a week. The cold was intense, but the highest elevation was passed, and on the 3d of November, the direction of the march was changed to the eastward.

At Bower's lake Garing Cho, where he was turned away by the Tibetans, Dutreuil de Rhins received a message from the prefect of the district, asking for an interview. The explorer turned a deaf ear and pushed on; but the road was bad, and the next day he was overtaken by the prefect with an escort of fifty armed men. He attempted no violence, but declared that he would lose his life, if the Frenchmen passed that way. Dutreuil de Rhins showed his Chinese passport, and the prefect yielded; but on the 2d of December the caravan was stopped a few miles beyond Lake Nam-tso by an officer from Lassa, who announced the coming of a deputation from the city. This soon arrived. It was composed of the Imperial Commissioner's aide, three Chinese officers of the garrison, two Tibetan functionaries and three lamas, all splendidly dressed and extremely courteous in manner. They declared that nothing would give them greater pleasure than to receive the foreigners at Lassa, but they had to obey the inflexible law of the country. The

Tibetans laid the responsibility of the refusal upon the Chinese, and the Commissioner's aide said:

> You and I understand the rules of international courtesy, but nothing can be done with these barbarous Tibetans. If you only had a Pekin passport for Lassa I should open the way for you.

Forty-five days were spent in useless parleying, and then the march was resumed, this time towards the north-east. After crossing the frontier of Tibet, the party struck the most northerly of three commercial roads that lead from Lassa to Ta-Tsien. This was the route travelled by Miss A. R. Taylor, in 1892. On the 15th April the monastery of Tashi-gupa was reached, and here it was hoped to purchase supplies at a fair then open; but the lamas would have nothing to do with the strangers and strictly forbade dealings with them. They were even worse treated at the Kier-ku monastery, where they arrived on the 20th of May, in the middle of a rain, the first they had seen for a year. Their interpreter was pelted with stones and shelter in the village was refused to them.

All the eastern Tibetans were found to be much more inhospitable and violent than those of the west and south. Their fanaticism is unchecked even by the Chinese authority.

Of the three roads which lead from Kier-ku to Hsi-ning, Dutreuil de Rhins chose the shortest and most direct, but also, as the event proved, the most dangerous.

He started on the 1st of June, but missed the way and did not reach the first village, Tau-Buddha, till the next day in a pouring rain, which delayed the march for twenty-four hours. In the night two horses were stolen from the camp, and when inquiry was made for the head men in order to lodge a complaint, the natives refused to say where they could be seen. This seemed to be an occasion for a decided step, and Dutreuil de Rhins took the first two horses that came to hand, announcing that they would be returned as soon as he had had an interview with the head man. The Tibetans fled to their houses and opened fire on the caravan, mortally wounding Dutreuil de Rhins and killing several of the animals. The men of the neighboring villages hurried to the spot and joined in the attack. The ammunition of the caravan was soon exhausted, and the Tibetans rushed upon the party. M. Grenard was abandoned by his men and captured, to be turned adrift at the frontier of the district. He found shelter with a Chinese Consular agent, who informed him that M. Dutreuil de Rhins had been thrown into the river.

At Hsi-ning M. Grenard was kindly received by the Chinese

authorities, to whom the Tibetans ultimately forwarded the papers and effects of the expedition.

A MAN WITH A TAIL.—The *Bulletin* of the Paris Geographical Society, for the second quarter of 1895, contains a paper in which M. Paul d'Enjoy, *procureur* of the Republic at Bac-Lieu, in French Cochin China, gives an account of a trip to the Moï country in the spring of 1890.

The name *Moï* is an Annamite word equivalent to *barbarian*. The tribes to which it is applied have lived in Indo-China from the earliest times, and M. d'Enjoy suggests that they are perhaps the monkeys, whose battles with the gods are described in the sacred books of India and represented in the bas-reliefs of the Cambodian temples.

Several districts in the province of Biên-Hoa are inhabited by half-civilized Moïs, subject to the French authority. These people, modified physically and morally by mixture with the Annamite blood, pay taxes, cultivate rice-fields, carry their goods to market and make their purchases in the shops.

The independent Moïs, on the contrary, live an entirely wild life.

They are visited every year, during the dry season, by the Annamite traders, who ascend the Dong-Naï in their boats, laden with red cotton umbrellas, glass beads and ornaments, blankets, and above all with bottles, cracked pots and broken pitchers, and exchange these articles for resin, woods and gums, ivory or gold dust. So long as the trading is fairly conducted there is nothing to fear; but if there is cheating, the savages take a bloody revenge. One day M. d'Enjoy was called upon to try two Moïs who had been concerned in the murder of four Annamites. The Moïs were powerful men, with long hair and beards and nail-like talons, and their ankle-bones stood out like the spurs of a cock. They wore a red cord round the waist, and bracelets made of rattan. They refused to prostrate themselves before the "mandarin" and they admitted the charge against them without hesitation, nor could they be made to understand that they had done anything wrong. "A man that kills," they said, "may kill, because he kills." When told that they would be locked up, to begin with, they clapped their hands, and replied:

> We were never so happy. No chief could dream of a finer house than the prison, and only to stay there for the rest of our lives we are ready to kill anybody for you.

M. d'Enjoy entered the country of these wild men just beyond Tri-An. The first village, in the unbroken forest, was composed of a single habitation in the form of a long tunnel made of sticks meeting at the top like the sides of the letter A and covered with leaves. This tunnel was 150 feet long, a little more than three feet high and six or seven feet wide at the base of the triangle, and it was open at each end.

The children, playing outside, set up a cry at the sight of M. d'Enjoy and his party, and at the sound a number of naked, wild-looking creatures rushed out of the tunnel and took to the woods like so many monkeys. M. d'Enjoy and his men were at the foot of a great tree, where a Moï was engaged in gathering honey. Alarmed by the flight of his companions, this man descended rapidly, stepping on the bits of wood which he had driven into the tree till he was about fifteen feet from the ground, when he made a spring and rushed, with his head down, to break through the circle about the trunk; but he was captured.

In the tunnel were found bamboo pipes, polished stones, copper bracelets and pearl necklaces.

With some difficulty the prisoner was induced to talk. The village belonged, he said, to the Leos, a warlike tribe, who fled at the sight of the strangers, because they took M. d'Enjoy, in his long white dress, for the demon of the moon.

The Moï had an oval face, with a long nose and smooth hair. He was tall and well made, with vigorous limbs, and he looked like a bronze statue. His ankle-bones were enormous, like those already noticed, and he had a tail. M. d'Enjoy says:

> This discovery stupefied me. I approached him, and to be certain that I was not the plaything of an illusion I felt with my hand his caudal appendage. I satisfied myself in this way that the vertebral column of the Moï was prolonged beyond the body by three or four vertebræ so as to form a little tail like that of a Faun.*

The prisoner turned round and said, drawing a long sigh, that once all the Moïs had tails. The tail was a mark of the pure race, and it was becoming rarer with every generation since the day when the Moï king, whose tail was three cubits in length, had been driven from the rich plains of his ancestors.

The savage then recited a long poem, which the interpreter was not able to follow. Water and wine and spirits were offered for

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* Cette découverte me stupéfia; je m'approchai de lui et pour être certain que je n'étais pas le jouet d'une illusion, je tâtai l'appendice caudal du sauvage.

Je constatai ainsi que la colonne vertébrale du Moï se prolongeait extérieurement au buste, de trois ou quatre vertèbres pour former une petite queue de faune.

refreshment, but in vain; the Moï quenched his thirst with the juice of a liana. At nightfall a guard was set to watch him, but in the morning the prisoner was gone and the guard was delirious with fever. In a lucid interval he told how he had been led to drink the juice of a liana. The fever was so violent that M. d'Enjoy determined at once to return to Biên-Hoa, where the sick man recovered, though his faculties were for a long time dulled.

Circumstances have interfered with M. d'Enjoy's purpose to make more extended explorations in the Moï country, but it is to be hoped that he will not resign himself to inactivity. A man with a tail is no slight trophy to bring back, on paper, from a brief excursion; but a living Moï with prolonged vertebral column, safely landed at Biên-Hoa, or still better at Saïgon, would be a pearl of price. It is true that the liana juice is a serious obstacle in the way, and yet the timely exhibition of chloroform to the savage would work wonders.

The Leopoldinisch-Carolinische Akademie, Halle a/S, announces the death of its president, the Government Privy-Counsellor Prof. Dr. Hermann Knoblauch, at Baden-Baden, on the 30th of June, 1895, in the seventy-sixth year of his age.

Joseph Thomson, the well-known explorer of Central Africa, died on the 2d of August, at the early age of thirty-seven years. He was born and educated in Scotland, and began his African career as geologist of the Royal Geographical Society's expedition to Central Africa, under the conduct of Keith Johnston, in 1879. On the death of the leader within a few months, Mr. Thomson took charge of the party and returned to Zanzibar in a year, having done much good work.

In 1883–84 he explored Masai-Land for the Royal Geographical Society, and received their Founder's medal. He afterwards visited the Central Sudan and Morocco, where he twice crossed the Atlas range.

His latest journeys in British Central Africa were interrupted by failing health, which finally gave way.

With rare qualifications for the explorer's task, Mr. Thomson possessed uncommon tact and patience in dealing with uncivilized races, and it is to be remembered to his honour that he never found it necessary to resort to bloodshed.

SIXTH INTERNATIONAL GEOGRAPHICAL CONGRESS.

The Congress was opened at the Imperial Institute, London, on the 26th of July, with addresses by the Duke of York and by Mr. Clements R. Markham, President of the Royal Geographical Society and of the Congress. These addresses were acknowledged, on behalf of the foreign delegates and members, by ex-Chief Justice Daly, President of the American Geographical Society, and then followed a reception, held in the gardens of the Institute.

M. E. Levasseur opened the discussions with a paper on Geography in Schools and Universities. Prof. Lehmann, Mr. Yule Oldham, Mr. Herbertson, Mr. Mackinder and others spoke on the subject, and a committee was appointed to draft a resolution in favour of improved methods of geographical teaching.

The Scientific Exploration of the Antarctic Regions was the subject treated by Dr. George Neumayer, who recommended international co-operation in the work and the simultaneous advance of three expeditions along the meridians of New Zealand, Cape Horn and Kerguelen Island.

Admiral Markham spoke on Arctic Exploration, and expressed the opinion that the route by Franz Josef Land offered better prospects than any other.

Gen. Greely, in a paper on the Scope and Value of Arctic Exploration, distinguished its three phases: the commercial, which ended with the last century; the geographical, which culminated with the expeditions in search of Franklin, and the scientific, which now prevails. It could be proved, he said, that Arctic industries had contributed £250,000,000 to the wealth of the world.

Mr. S. A. Andree described his plan for reaching the North Pole by Balloon. The start will be made in June, 1896.

Gen. Walker explained the operations of the Trigonometrical Survey of India, and M. Charles Lallemand read a paper on the general levelling of France.

Gen. Sir Charles Wilson presented the report of the committee appointed by the Berne Congress, in 1891, on Prof. Penck's plan for a map of the world on the scale of 1:1,000,000. The report recommended a projection according to which the limits of the sheets would be formed by parallels and meridians. A truncated-conical projection was the only one which could be taken into consideration. The sheets would cover 4 deg. in height and 6 deg. in breadth, and for the regions within the Polar circles 12 deg. in

breadth. The committee unanimously recommended for the map the adoption of the meridian of Greenwich and the employment of the metre for the altitudes. The recommendations were unanimously approved.

Prof. Brückner, on behalf of the Geographical Society of Berne, offered a resolution that the official staff of each Congress should act until the meeting of the following Congress. The resolution was adopted.

A paper devoted to a review of the work in oceanography during the past twenty years, and especially to the results of the *Challenger* expedition, was read by Mr. J. Y. Buchanan, who also presented, in the name of the Prince of Monaco, an account of the scientific cruises of the yacht *Princesse Alice*.

Prof. Wm. Libbey, Jr., presented the results of his observations on the Relations of the Gulf Stream and the Labrador Current.

Sir John Kirk read a paper on the Extent to which Tropical Africa is suited for Development by the White Races or under their Superintendence. So far as climate was concerned, he considered that the higher lands, above the level of 5,000 feet, were suitable for colonization, and that the fevers were so mild that they did not offer an obstacle. As a rule, the healthy plateaux of Africa were fertile, and some were rich in minerals. His survey excluded, as unsuitable, all the western coast, including the Congo State. German South-western Africa, perhaps, British South-eastern, and East Africa and the mountainous districts of Abyssinia are regarded as promising fields.

Mr. H. M. Stanley, M.P., agreed with Sir John Kirk, but thought his paper looked too far ahead. There was no intention to colonize Central Africa, but there was a purpose to extend commerce, to improve the black man, and to make colonization possible in the distant future. The steamers on the Congo and railroads would do a great part of this work. He believed that in time Central Africa would be like Mexico and Brazil and Ceylon, and he made light of the fever, affirming that he had been in a certain State in the United States where there were more fevers in twenty-four hours than could be found in any part of Africa. The subject was further discussed by Count Pfeil, Mr. Ravenstein, Mr. Silva White and M. Dècle, and the President then called upon Colonel Slatin Pasha, who gave the following account of his captivity in the Sudan and his escape:

In the middle of Africa lies the former Egyptian Sudan, now under the rule of Caliph Abdullah, the despotic head of the Mahdists. No European can venture to

cross the limits of this land, cut off from civilization, extending in the south along the Nile to Redjaf, and east to west from Kassala to near Wadai. Death or life-long captivity would be his lot. Yet it is only within the short period of ten years that the land has been subjected to this miserable fate. For more than sixty years, since the time of Mohammed Ali, it remained under the rule of Egypt, and was open to civilization. In the chief towns were found Egyptian and European merchants; in Khartum itself the foreign Powers had their representatives. Travellers of all nations could pass through the land unharmed, and found protection and help through those representatives. Telegraphs and a regular postal service facilitated intellectual intercourse with the most distant countries. Mohammedan mosques, Christian churches, and mission schools looked after the religious and moral education of the young. The land was inhabited by the most diverse tribes, many of which lived in hostility with one another, but were compelled by the severity of the Government to keep the peace. Discontent, no doubt, prevailed in the land. Its cause was to be sought in the avarice of the officials, especially of the native Sudanese, who latterly had acquired high positions, and by their oppression and tyranny enriched themselves as quickly as possible, and also in the ignorance of the country on the part of the Europeans, who, often with the best intentions, issued orders directly contrary to the traditions and views of the Sudanese, which could not but excite ill will. Mohammed Ahmed knew and took advantage of the mood of the country. Well knowing that only a religious factor could unite the hostile tribes, he maintained that he was the Mahdi sent by God, the deliverer of the country from a foreign yoke, the regenerator of religion. He roused the tribes to war against the Government, promised his adherents in case of death the everlasting joys of Heaven, in case of victory four-fifths of the booty to the survivors. Thus were fanaticism and avarice, the two chief qualities of the Sudanese, awakened. The spark grew to a bright flame. Victory after victory was gained by the insurgents. Kordofan fell into their hands. The army sent under Hicks for the reconquest of the land was annihilated, and I was compelled, after long and vain struggles, to surrender. The insurgents marched on Khartum. On arriving in the neighbourhood of that town I had chains put round my neck and feet, since I was suspected of being anxious to make my escape and join General Gordon. The town was besieged. The personal valour and energy of General Gordon were spent in vain in endeavouring to avert the coming calamity. Khartum fell on the 20th of January, and with it the bravest of its defenders, General Gordon himself, who was murdered on the highest steps of his palace. His head was severed from his body and was mockingly shown to me as I lay in irons. The fanatics behaved with fury in the conquered town. Men and women were killed, with few exceptions, and the survivors were maltreated and tortured with the most refined cruelty in order to extort from them information as to the place of concealment of property they might have hidden. Only young girls and pretty women were spared—not out of compassion. They did not wish to lose them, nor to torture them, as thus their beauty would have been impaired and their value diminished. They were distributed among the adherents of the Mahdi—among them many Christian women and girls. After the retreat of the English army from Dongola I was permitted, after nearly eight months of captivity, a certain amount of liberty, on condition that I should never leave the Caliph Abdullah ebn Mohammed, and that I should always remain in his immediate neighbourhood as his moulazim (body guard). Two circumstances induced him to watch me closely. As I was the last living military governor, he believed, in his entire ignorance of the political conditions of European countries, that in case of my escape I should be in a

position through my more accurate knowledge of the country to induce the Egyptian or English Government to take hostile measures against the Sudan. On the other hand, it flattered his vanity to have as his servant his former master, one to whom most of the western Arab tribes, and among them his own allies in blood, the Taascha-Bazara, had been subject. Severe and cruel, he trusted no one and governed despotically, solely according to his own good pleasure. Since he is of the tribe of the Taascha-Bazara (that is the name applied to all the nomadic rearers of horned cattle) and belongs to Darfur, he relies, as a stranger in the Nile valley, only on his kinsmen by blood, the western Arab tribes and armed slaves, while he sought to diminish the strength of the native tribes of the Nile valley, the Gjaaliin and Danagla. By disarmament, confiscation of property, executions, and the despatch of those capable of bearing arms against his enemies, so that they might die in battle or through privations, he has so weakened these tribes that they are now compelled to endure his rule. The greater part of them regret that they have been stirred up by fanaticism or on other grounds to rise against the former government. They now understand that the government has only been changed, that religion served only as a flag, as a means for the attainment of the end desired. They now long for the end of the tragedy which they have themselves brought upon the scene. Only after eleven years' captivity did I succeed in gaining my freedom. Although all intercourse with any one was forbidden to me, I was nevertheless in secret relation with tribes of the country formerly known to me. For years and on several occasions I had determined on flight, but those participating in my attempts were always deterred by the dangers of the undertaking. At the close of last year I sent a man to Cairo, and through the intervention of the Austrian Consul-General, Baron Heidler, and Major Wingate, Director of the Intelligence Department for Egypt, he received the necessary means for my flight out of the money deposited by my relatives. By means of a large sum secured to him by contract in the event of the success of the undertaking, he gained over people to venture their lives in delivering me. On the night of February 20, after the Caliph had gone to rest, I left the town unobserved and reached the camels held in readiness in the steppe. My guides, knowing that they had only a few hours' start, forced their pace. After an unbroken ride of twenty-one hours we had accomplished one hundred and thirty miles, but the exhausted animals refused to go farther. For six days I remained hidden in the inhospitable Gilf Mountains, until my guides, who were Arabs of this district, succeeded in obtaining other camels. At first it had been our intention to make good our escape by travelling as quickly as possible, but now the only chance of success was strategical manœuvring, as all routes were closely watched by the dervishes, who had overtaken us. However, we succeeded in crossing the Nile near Berber and reaching the Etbai Mountains by a roundabout way. Here my last guide, an old Arab, fell ill, and I was compelled to leave him behind, together with the only camel which was still in my possession. Now commenced the worst part of the whole journey, as I had to proceed on foot. But the hope of freedom enabled me to overcome all difficulties. On March 16 I left the mountains and reached Assuan, the first settlement of civilized men. My feelings at that moment were indescribable. I was saved from my enemies, from the hands of a fanatical despot, and had left behind me a country governed by absolute and arbitrary tyranny, and separated completely from any civilization. Behind me was the Sudan, where so many Christians are still kept in bonds of slavery and where the greater part of the population prays to God for liberation. I reached Cairo by steamer on March 19. Everywhere I received tokens of the most sincere sympathy with my fate. Standing now here, in the middle o

civilized society, again a man among men, my thoughts turn often back to the fanatical barbarians with whom I had to live so long, to my perils and sufferings amongst them, to the unfortunate companions of my captivity, and to the enslaved nations of those remote territories. My thanks are due to God, whose protecting hand has led me safely through all the perils behind me.

Mr. C. E. Borchgrevink, a young Norwegian, read a paper on the Voyage of the *Antarctic* to Victoria Land. In order to join the *Antarctic*, which was a whaling vessel, he had been obliged to ship as a common sailor, and had been able, therefore, to take with him only a few instruments. The vessel left Melbourne September 20, 1894, and the story of her voyage is as follows:

On October 18, while steering for Royal Company Islands, they had snow on board for the first time. At night it was moonlight, and at 12 o'clock the aurora australis was visible for the first time, with white shining clouds rolling from west towards east. It formed into a shining ellipse, with an altitude above the southern horizon of 35 degrees. The *Antarctic* was at that time in the vicinity of Macquarie Island, and thus in latitude about 34 degrees south. The aurora seemed constantly to obtain its light force from the west, and the intensity of its light cloud culminated every five minutes, after which it suddenly died out, to regain its former magnificence and beauty during the succeeding five minutes. The phenomenon lasted till 2 o'clock, when it was gradually lost in an increasing mist. They set out for Campbell Island on the 22d, and dropped anchor in North Harbour on the eve of October 25, shifting the following day to Perseverance Harbour, where they filled their water tanks and made their final preparations before proceeding south. On October 31 they weighed anchor, and during the next few days, proceeding further into the fifties, the air and the water kept an equal temperature at 44° F. On the 6th of the following month, in latitude 58° 14′ and longitude 162° 35′, they sighted an immense barrier of ice, or chain of icebergs, extending no less than from forty to sixty miles from east to northwest. The top was quite level and absolutely white. The highest point was 600 feet high. The perpendicular sides were dark ashy gray, with large worn green caves, in which the furious waves were raging and tearing, bursting forth in brilliant foam hundreds of feet up in the air. Numerous icebergs were floating about in all directions, and were undoubtedly children of this enormous monster. It was here they discovered that their propeller was out of order, and the *Antarctic* was again headed northward, anchoring in Port Chalmers on the 18th, where the damage was soon repaired. They again stood southwards on November 28. By the time they reached 55° the albatross had left them and likewise the Cape pigeon, but the white-bellied storm petrel still followed in their track. On December 7 they sighted the edge of the pack ice and shot their first seal, which was of the white kind. On December 8, in latitude 68° 45′, longitude 171° 30′, large streams of ice were drifting around them. A strong ice-blink appeared towards the south, and the presence of the elegant white petrel gave unmistakable evidence that now they had before them those vast ice-fields into which the gallant Briton, Sir James Ross, on January 5, 1841, successfully entered with his famous ships *Erebus* and *Terror*. In the evening the *Antarctic* slowly worked its way through the edge of the pack ice, which consisted of large and heavy hummocky ice. Of marine animals they saw multitudes. The large-finned whale, known in Norway as the blue whale, were spouting about in all directions. The white petrel were numerous here. The white-bellied petrel de

parted at the edge of the pack, leaving the icy regions to its darker, hardier brethren. They shot several seal, but seldom saw more than one or two together and never more than seven, most having scars and scratches in their skin. When the ship entered the pack the temperature of the air was 25°, that of the water 28°, which latter held all through the pack. On the 14th they sighted Balleney Island, and found it, as according to Ross, in latitude 66° 44′, longitude 164°. The icefloes grew gradually larger as they approached land, and it was evident that the icepack then around them was for a great part discharged from the glaciers of the Balleney. They got a good view of the lofty peak of the Balleney, which rose to a height of 12,000 feet above the sea level. On December 16 they moored the *Antarctic* to a large floe of pancake-like ice, which told its tale of the previous long calm. On December 24 they were in latitude 66° 3, longitude 167° 37′ east. During the day they had stormy weather, but the evening was beautiful and the sun just touched the horizon on its lowest descent. They were probably the only people who ever saw the midnight sun on Christmas Eve. On Wednesday, the 26th, they crossed the Antarctic Circle. On New Year's Eve they were in latitude 66° 47′, longitude 147° 8′ at 12 o'clock. While the sun was shining bright, they rang the old year out and the new year in, and saluted with their guns in honour of the occasion. In latitude 67° 5′, longitude 175° 45′ east, was secured a specimen of *Apterodytes Forsteri*, a large penguin. In all only four of these birds were secured, and it was never seen in company with another of its kind. On the 14th, in latitude 69° 55′ and longitude 157° 30′ east, they came again into open water, having spent thirty-eight days in working their passage through the pack ice. They steered straight for Cape Adare, on Victoria Land, which they sighted on January 16. On the 18th, in latitude 71° 45′, longitude 176° 3′, the temperature of the air was 32° and the temperature of the water 30°, and the sky was completely clear. The Cape, which was in 71° 23′ and 169° 56′, rose to a height of 3,779 feet, and consisted of a large, square, basaltic rock with perpendicular sides. From there they saw the coast of Victoria Land to the west and south as far as the eye could reach. It rose from dark, bare rocks into peaks of perpetual ice and snow, 12,000 feet above the level of the sea, Mount Sabine, above the rest, standing out shining in the rays of the midnight sun. Conic tops covered the plateau and ran over in mighty glaciers. They counted as many as twenty of them in the close vicinity of the Bay of Adare. On the 18th they sighted Possession Island, with its peculiar contours standing out sharply against the bright sky. They effected a successful landing on the North Island, pulling their boat upon the shore, and they were at once furiously attacked by the penguins, which covered the very ground of the island and seemed much annoyed by seeing the foreigners intruding on their domain. Their hoarse screams filled the air, and it was with a considerable strain of his voice that, on landing, he addressed his countrymen in a few words, informing them that they were the second party who had set foot on that island, and that Sir James Ross had preceded them, having fifty-four years ago landed there and planted the English flag. They gave three cheers for that great British navigator, and also for Commander Captain Svend Foyn, who so bravely sent out that present Antarctic expedition. The ground on the island was covered with a deep layer of guano, which, in time, might prove very valuable to Australasia. The island consisted of volcanic, vesicular lava, rising in the south-west into two pointed peaks of 300 feet in height. He scaled the highest of these and called it Peak Archer, after Mr. A. Archer, M.L.A., of Rockhampton, Queensland. To the west the island rose gently upward, forming a bold and conspicuous cape, which, not being named by Sir James Ross, it was left to him (Mr.

Borchgrevink) to christen. He gave it the name of Sir Ferd. von Mueller, whose scientific fame he already as a boy had learnt to value on the Continent. He quite unexpectedly found vegetation on the rocks, about 30 feet above the sea level. Vegetation never was discovered in such southern latitudes before. Possession Island was situated in latitude 71° 56′, longitude 171° 10′. It was remarkably free from snow. He judged it to be from 300 to 350 acres in size, and they gave it the name of Sir James Ross's Island. On February 20 they steamed southwards, and sighted Colman Island on the 21st, at midnight. Finding the eastern cape of this large island unnamed, they called it Cape Oscar, in honour of his Majesty the King of Norway, whose birthday it happened to be on that day. He noticed great irregularities in their compass at Colman Island. Undoubtedly that island contained secrets of scientific value, which would be well worth the attention of future Antarctic researches. On the 22d they were in 74° south. No whales appearing, it was decided to head northwards again, although they all regretted that circumstances did not permit them to proceed further south. On the 23d they were again at Cape Adare. They landed that night, being the first human creatures who ever put foot on the mainland. The penguins were, if possible, even more numerous here than on the Possession Island, and they were discovered on the very cape as far up as 1,000 feet. In latitude 66°, longitude 172° 31′, they ran into open water again, having this time only spent six days in the ice pack. On the 17th of February the Aurora appeared stronger than he ever saw the Aurora Borealis. It rose from south-west, stretching in a broad stream up towards the zenith, and again towards the eastern horizon. The *minimum* temperature within the Antarctic Circle which they experienced was 25° F., the *maximum* being 46° F. The average temperature for January and February kept very much the same. The temperature of the water kept at 28° F. all through the ice pack, always rising one degree where a larger sheet of water broke the ice fields. In the large bay at South Victoria Land the temperature kept constantly about freezing point. It was evident that a warm, north-running current existed in the bay, which undoubtedly had a constant direction northwards, and broke the ice fields at the very place where first Sir James Ross and then they successfully penetrated to the open bay of Victoria Land. Within the Antarctic Circle the barometer at 29° always indicated calm, beautiful, clear weather, and even down to 28° it kept fine. This low barometric indication was remarkable where the dryness of the air should help in causing a high pressure. The movement of the ice distinctly pointed to a north-easterly direction, and the scarcity of ice in the Bay of Victoria Land was undoubtedly not alone owing to warm currents, but also to the protection which the bay had against drift ice by the shore from Cape Adare down to the volcanoes, the Erebus and Terror. A particular specimen of rock which he picked up, composed of quartz, felspar and garnet fragments, held out some hope that minerals of economic value might occur in those regions. He made a thorough investigation of this landing-place, because he believed that here was the very place where a future scientific expedition might stop safely, even during the winter months. Several accessible spurs led up from the place where they were to the top of the cape, from there a gentle slope led on to the great plateau of the South Victorian Continent. The presence of the penguin colony, their undisturbed old nests, the vegetation on the rocks, and the flat table of the cape above, all indicated that here was a place where the unbound powers of the Antarctic Circle did not display the whole severity of their forces. Neither ice nor volcanoes seemed to have raged on the peninsula at Cape Adare, and he strongly recommended that a future scientific expedition should choose this spot as a centre for operations. At this conspicuous

cape there would, in his opinion, be ample opportunities for making meteorological observations, and scarcely any branch of science demanded research more than meteorology within the Antarctic Circle. He himself was willing to be the leader of a land party to be landed either on the pack or on the mainland near Colman Island, with skier, Canadian snow-shoes, sledges and dogs. From there it was his scheme to work toward the South Magnetic Pole, calculated by Ross to be in 75° 05′ and 150° east, and Colman Island lying in 73° 36′ south and 170 02° east, he would have approximately to travel about 160 miles to reach the South Magnetic Pole. If it were the means of determining the periodical changes in the Pole of terrestrial magnetism alone, a future expedition would, from a scientific point of view, be an entire success. As to the zoölogical result of future research he expected great discoveries. It would indeed be remarkable if in the unexplored Victoria Continent, which probably extended over an area of 8,000,000 square miles, or about twice the size of Europe, there should not be found animal life hitherto unknown in the Southern Hemisphere. It was true that the scientific results of this expedition had been few, but where already so many important facts demanded further research the arguments plainly proved that the time was ripe and that further delay of a scientific expedition to South Victoria Continent could scarcely be justified.

After some discussion, Prof. von den Steinen offered, and the Congress unanimously adopted, a resolution that

The Sixth Geographical Congress, assembled at London, 1895, with reference to the exploration of the Antarctic regions, expresses the opinion that this is the greatest piece of geographical exploration still to be undertaken, and, in view of the additions to knowledge in almost every branch of science which would result from such scientific exploration, the Congress recommends that the several scientific societies throughout the world urge, in whatever way seems to them most effective, that this work be undertaken before the close of this century.

A paper by Baron Nordenskiöld on Ancient Charts and Sailing Directions was read by the President.

The Origin of the Mediæval Italian Nautical Charts was the subject of a learned paper by Prof. Hermann Wagner, and Mr. H. Yule Oldham called attention to the Importance of Mediæval Manuscript Maps in the Study of the History of Geographical Discovery.

Prof. Rein described his Observations on the Spanish Sierra Nevada, a little known and most interesting range of mountains.

Gen. Annenkoff then addressed the Congress on the Importance of Geography in view of the present Economical and Agricultural Crisis.

It was decided to accept the invitation of the Geographical Societies of Germany to hold the next Congress at Berlin.

Other resolutions adopted were:

That it is desirable to bring to the notice of the geographical societies interested in Africa the advantages to be gained—(1) By the execution of accurate topographical surveys, based on a sufficient triangulation, of the districts in Africa suitable for colonization by Europeans; (2) by encouraging travellers to sketch areas

rather than mere routes; (3) by the formation and publication of a list of all the places in unsurveyed Africa which have been accurately determined by astronomical observations, with explanations of the methods employed; (4) by the accurate determination of the position of many of the most important places in unsurveyed Africa, for which operation the lines of telegraph already erected, or in course of erection, afford so great facilities.

One submitted by Dr. Gregoriev, on behalf of General Tillo, St. Petersburg, expressing the importance of drawing up tabular and cartographic catalogues of all the original topographical sources for all the countries and for every geographical region, and expressing a wish that all countries which have not published cartographic catalogues should be invited to do so, and that the geographical societies of the different countries should be invited to interest themselves in the matter.

A resolution concerning the results of recent research in the Baltic, the North Sea and the North Atlantic, especially with regard to fishing interests, and recording the opinion of the Congress that the survey of those areas should be continued and extended.

A resolution acknowledging the necessity of an international system of stations for the observations of earthquakes.

It was agreed that the various geographical societies should be requested to study the question of the orthography of geographical names, and prepare a report on the subject for the next Congress.

A resolution, proposed by Mr. Frank Campbell, expressing approval of the principle of State-printed registration of literature as the true foundation of national and international bibliography, and approving of the appointment of an international committee to further that object.

A resolution, submitted by M. Jacques Léotard (Marseilles), expressing the wish that all geographical maps should bear henceforth the date of their publication.

On the motion of M. De Rey Pailhade, it was agreed to request the various geographical societies to study the subject of the application of the decimal system to time and to angles, and of a symbolical system of hour-zones, and report to the next Congress.

THE NORTH GREENLAND EXPEDITION.*

The steamer *Kite* arrived at St. John's, Newfoundland, on the 21st of September, bringing Mr. Peary and his companions, Matthew Henson and Hugh Lee, from their two years' exile in North Greenland, a period marked by steadfast devotion to duty, and unfaltering courage in the face of accumulating dangers. Like so many other heroic enterprises in the far North, this also has met with undeserved defeat. The story of the past year is told in the following letter reprinted from the New York *Sun*, of September 22:

ST. JOHN'S, N. F., Sept. 21.—The third night after the *Falcon* left me off the Petawak Glacier I camped near the head of Olriks Bay, in Inglefield Gulf, to hunt deer. We had encountered but little ice, and the voyage northward to Inglefield Gulf in a whaleboat had not been arduous. A short stop was made at the Bird Cliffs of Saunders Island to shoot.

We reached Olriks Bay just in time to escape a furious southeaster of three days' duration, which kept my hunters imprisoned under the shelter of rocks unable to get back to camp. The whaleboat had to be nearly filled with stones to prevent its being blown away. We reached Anniversary Lodge [Peary's headquarters at the head of Bowdoin Bay, Inglefield Gulf], on September 6, with five hundred pounds of venison, birds and hare. Bowdoin Bay was a chaos of icebergs and large pans of ice cemented by heavy young ice. The boat was left several miles from the Lodge. Evidently the season would be very short. There was no time to be lost in obtaining my winter's supply of meat and getting it to the Lodge before navigation closed.

I had intended immediately upon my return to take Mr. Lee and the natives with me to Kangardluksoah hunting, but his lonely, anxious vigil during my absence had left Lee in no condition to go or to be left alone again. Matt Henson left with the party of natives twenty hours after our arrival, and returned on September 16, with six deer and several hare. On the following day, with Lee, I went to Karnah [near the entrance to Bowdoin Bay], whence I took my other whaleboat and all the able-bodied native men in the settlement to Cape Cleveland, hunting walrus. The natives, with a boat I had loaned them, had already killed twenty, and the animals were becoming somewhat shy, but I harpooned and secured seven before the rapidly forming young ice compelled a retreat.

The young ice and the head wind delayed our return until September 27, when one boat load of meat was landed at Anniversary Lodge. A second load was landed on September 30. These two days and one while I was at Cape Cleveland were the only days during the season when the whaleboat could reach the Lodge without being dragged over the ice. On October 1 the bay was frozen over for the winter.

September was cold and stormy. The winter's meat supply for ourselves and the

* See the *Journal* of the AMERICAN GEOGRAPHICAL SOCIETY, Vol. XXVI, 1894, pp. 397–406.

dogs being assured, my caches of provisions on the ice-cap next demanded our attention. Two days after the last load of walrus had been secured, Mr. Lee, with Matt Henson and the native Huktah, left the Lodge to dig out these caches and rebuild them for the winter.

Four days later they returned and reported their inability to find the caches owing to the extraordinary depth of new snow on the ice-cap. This was very serious news, and after the dogs had been thoroughly rested and fed I started myself for the ice-cap with Henson and one Eskimo. As we reached the vicinity of the first cache it began snowing, rendering immediate search impossible. The Eskimo, fearful of a storm, slipped away unobserved and started back for the Lodge, which he reached four days later, weak from hunger and half frozen. Henson and I were imprisoned in a tent for six days, when the storm ceased.

Standing at the entrance of the tent, the accumulation of new snow was level with my eye. The actual snowfall on a level was three and a half feet. Two days were spent in an exhaustive but vain search for the caches, all buried, irrecoverable, lost in the snow. I felt like a man shipwrecked and cast away on a desert shore with only the clothes on his back. I must begin again at the very bottom, with the previous season's work blotted out entirely. Nearly all my biscuit and milk, all the compressed pea soup, and every ounce of two fundamental items of an Arctic sledge's equipment, rations of pemmican and alcohol, in all a ton and a half, were gone. The chances were ten to one against accomplishing anything under such an enormous handicap.

Returning to the Lodge on October 20, I found the entire land buried as I had never seen it before. The following days were gloomy ones at the Lodge. The idea of giving up that for which we were there never occurred to us, but the question how to accomplish our object remained unanswered.

The sun was seen for the last time on October 23. During the remainder of October and November five more deer were added to our stock. The preparation of the house for the winter was completed. Several short sledge trips were undertaken, and a general plan of campaign and scheme of equipment and rations for the spring march were decided upon and two sledges were completed. Reindeer meat for ourselves and walrus for the dogs must take the place of pemmican. Coal oil must serve as a substitute for alcohol. I had nothing with which to replace the invaluable pea soup, only 130 pounds of biscuit in tins and less than two cases of milk. The necessary amount of the biscuit must be made up from bulky ship's biscuit in open boxes, and by going without milk during the winter we would have a little more than half a ration for the ice-cap journey.

The light of the December moon was utilized for a sledge trip to Cape York, with Mr. Lee as my companion. Stormy weather delayed us so much that on our return we ran short of provisions, and the last march, from Saunders Island to the Lodge, was a forced one of forty-six hours without food or sleep. Off Cape Parry, while travelling on young ice, we had a narrow escape from a mishap, a large berg disrupting near us and breaking up the ice on which we were travelling.

The holidays were uneventful, and but for the presence of many natives from Karnah, the nearest and this winter the largest of all the native settlements, they would have been among the bluest of our winter days. During the January moon I made a five days' trip to various settlements on the Sound. Lee and Henson also made shorter journeys, but most of the time was occupied in work on our equipment. February and the first half of March were devoted to the same work, relieved by two or three deer hunts and sledge trips to various settlements on the Gulf for material for clothing, dog harness, and so on.

The sun was seen for the first time on February 17. The latter part of the month Mr. Lee returned from a trip to Robertson Bay [on the coast of Baffin's Bay north of the camp] in bad condition and was laid up for two weeks or more. On March 12 Matt Henson started south for Wolstenholme Sound and Petawak Glacier to purchase dogs. The week following his departure I utilized in sledging supplies to the moraine, and on March 20 met him at Peterawick on his return. Sending Henson home to rest, I remained at Peterawick five days purchasing dogs and walrus meat and engaging men to go on the ice-cap. On March 27 I reached the Lodge again with a cavalcade of nine sledges carrying my purchases. I found Mr. Lee nearly recovered.

The next four days were occupied in transporting the sledges to the moraine, fitting out four Eskimos who were to accompany us with suitable gear, and putting the last touches to our own outfit. All my records, journals and valuable papers were deposited under the house, where I hoped they would be safe from fire and prying natives. The remaining provisions and more valuable articles were taken into the house, and leaving everything to the honesty of my native friends, in whose hands I left letters to cover the contingency of our non-return, we were ready to start.

On Monday, April 1, I left Anniversary Lodge with Mr. Lee, Henson, six Eskimos, and sixty-three dogs. Two of the Eskimos were to accompany us only for the day. The other four, forming the supporting party, would accompany us as far as the site of the previous season's pemmican cache, 124 miles distant on the inland ice. The day was clear and calm. The material on and at the edge of the ice-cap was divided into six loads, and we made an advance of twelve miles. Mr. Lee was not in such a condition as I could have wished, but with Yankee grit he insisted on going, and I believed it to be better for him than remaining behind alone. The following three marches were interrupted by further, but, with one exception, unsuccessful searches for the lost caches. Six inches of a seven-foot pole, marking the equinoctial camp, still projected above the snow. The discovery of this cache enabled me to replace my miscellaneous packages of ship's biscuits with sealed tins and complete my milk ration. This cache and the bamboo pole ten miles distant, which on the previous March had stood twelve feet above the snow and now showed less than three feet, were the only remaining traces of our previous year's work and one and one-half tons of indispensable sledge supplies. One of the Eskimos deserted on the third march, and returned to the Lodge with his dogs and sledge.

Six marches more brought us to the vicinity of the big pemmican cache. The weather during this time was clear and very cold. A biting wind had nipped the toes, cheeks and noses of all of us, in Lee's case, as it afterward proved, quite severely. One entire day was spent by the whole party in an unsuccessful search for the cache. We were forced to the conclusion that the storm had broken the signal off.

On the following day three Eskimos, with a sledge and ten dogs, started back, while we continued to advance with three sledges and forty-one dogs, myself leading with eleven, Lee with fourteen, and Henson with sixteen. A combination of unfavorable circumstances made the following week an unpleasant contrast to the previous one. I was obliged now to drive a team of dogs. Having no trail to follow, it was more difficult to drive. A redistribution of the dogs, and the consequent inevitable fighting until every dog knew his place, reduced the effectiveness of their efforts, and worse than this, Lee's toe was giving him much trouble.

The fifth march brought us into a violent wind-storm, rushing down from the interior to Petermann Fjord. This delayed us two days, demoralizing our dogs, working havoc with the harness and traces, and leaving the sledges buried in over-

whelming drifts. The close of the week found us only 200 miles from the moraine. We were 7,000 feet above the sea.

The following week was more satisfactory, placing something like a hundred miles to our credit. All this time the temperature ranged from —10° to —25° at noon, and —25° to —43° at midnight. We had met the midnight sun near the end of the second week, and now had continuous sunlight.

At the beginning of the fourth week it was evident that some change must be made. The dogs had become so fatigued I could no longer drive my team into the white, trackless, objectless desert ahead, and Mr. Lee's toe was giving him such trouble as to make it well-nigh impossible for him to handle a team.

By this time a number of the dogs had given out, and made it practicable to concentrate everything in two teams and send Lee ahead to set the course. This arrangement, with the daily icing of the sledges, enabled us to cover 122 miles in the week. It was a hard one. Some of the time we were almost 8,000 feet above the sea, and the average elevation for the week was 7,700 feet. The elevation had a marked effect on ourselves and the dogs, though we were able to walk at the moderate pace of two to two and one-half miles per hour without discomfort, and keep this up ten or twelve hours. A few sharp pulls on a sledge when the dogs balked or a few yards' run would take our wind completely, and the extra exertion would be followed by bleeding at the nose. The strength of men and dogs was reduced fully one-half, the raw, frozen meat ill-supplying the place of pemmican, even had we eaten a full ration of it, which we rarely did.

With our entrance upon the fifth hundred miles a series of mishaps occurred. Up to this time not a sledge had broken, but almost simultaneously with passing the four hundredth mile a runner of the largest sled went to pieces completely. A day was lost repairing the damage, and at the end of twelve miles the new runner broke beyond repair. Having no more material for repairing the second mishap, the sledge was converted into a three-runner, and we proceeded. At the end of the next march we fed the last of the walrus meat to the dogs. Only seventeen dogs now remained to us. After this the dogs went to pieces with startling rapidity, eleven being left at the end of the week, and these in such a condition that we were obliged to man the drag-ropes ourselves. We cached nearly everything and pushed on for the land. At the end of the next march the dogs were scarcely able to walk. We left them sixteen miles from the land and 5,000 feet above the sea in charge of Lee, with instructions to feed the weakest ones to the others until our return, and with Henson, two rifles, and four days' rations on a small sledge, I started down to the land in search of musk oxen.

After some trouble with crevasses we reached the land, but before we had finished our first rest the sky became overcast, and it commenced snowing. This weather continued while we remained on land, two days and nights, and we had to find our way back to the tent through snow and fog. During this trip we travelled until we were so fatigued, and our feet so sore, lame and bruised by sharp rocks, that we could scarcely walk. We slept on the rocks, without shelter, and returned to our tent exhausted with our efforts, and disappointed at finding no fresh trace of musk oxen.

The time of our absence had been scarcely less wearing to Lee than to ourselves. He was alone with a few starving dogs in that fierce frozen desert, uncertain of our return, helpless and doomed if aught happened to us.

Two alternatives now lay before us. We could start back at once, and the 200 pounds of walrus meat reserved for dog food for the return would probably keep the dogs alive two-thirds of the distance home. Then we could drag the loads the

remaining distance ourselves. With fresh, well-fed dogs the walrus meat would have sufficed for the entire distance.

The other alternative was to give some of this meat to the dogs now, then go on with them in search of musk oxen as long as it lasted. If we found musk oxen, well and good; if not, then we must retrace those weary 500 miles, dragging our own supplies, with the certainty that one and the probability that all of us would never complete the journey. But there was a chance. We were Americans. One of us carried about him the Red, White and Blue. We could not turn back.

The decision was quickly made. Next day, dragging the sledge ourselves, we returned to the cache through the dense fog, gave the dogs an ample feed of walrus meat, and loaded everything upon the sledge except rations for the return trip, which were cached under a conspicuous tripod formed of a sledge and two ski.

The following day, with a little assistance from the dogs, we returned to the last camp. Next day we descended to the land, reaching it just in time to be storm-bound on the moraine for two days; then, with Henson and all the dogs, we went on across the land, leaving Mr. Lee again to a lonely vigil. The arduous land travel increased our appetites to a painful degree, and, having had no meat for the past three days, we were glad to make a lunch from raw frozen walrus meat intended for the dogs. Even of this we were obliged to eat sparingly, as the dogs needed it more than we.

Twelve hours of marching showed no recent traces of musk oxen, but I saw a hare, which Henson shot, and we immediately camped on a small lake, cooked, and ate it to the last morsel. It was the first square meal we had eaten since leaving Anniversary Lodge, and we appreciated it accordingly. Our spirits were materially raised by this good fortune, yet the entire absence of musk ox signs made me anxious. I began to fear that perhaps they only visited this region later in the season, or the killing of some of their number four years before had frightened the rest away permanently.

Next day, after several hours' travelling, I saw an indistinct trace of a single animal. Following it I observed the track of a calf, then other tracks, then the previous day's feeding ground of the herd. A few hours later we saw the herd itself, a group of dark spots on a terrace far up a mountain. Safe, thank God! and my poor dogs should feast till they could eat no more. Fastening the dogs and climbing cautiously the slope of the mountain, we approached within 200 yards. Beyond this there was no cover, and our eyes were so weak and unreliable with snow glare that we could not see to shoot at this distance. Lying behind a big boulder till we regained our breath, we then advanced on a run with loaded Winchesters. In a few minutes one bull, five cows and four calves were ours. The remainder of the herd disappeared in full gallop over the summit of the mountain. A two days' unsuccessful pursuit of the herd followed, and then Henson went back to the moraine after the tent sledges and so on. During his absence of three days I searched unsuccessfully for musk oxen, living during that time entirely on musk ox meat *sans* biscuit, tea or salt. On the arrival of the boys we pushed forward toward Independence Bay over a most unpromising region, up and down steep slopes, through boulder-strewn gorges, lifting, pushing, almost carrying sledge and load, double banking, sometimes travelling for hundreds of yards on sharp, snow-free rocks, and breaking the sledge every few hours. The almost complete absence of snow on the land was extremely annoying.

At the end of four days we reached the precipitous shore completely exhausted. The last pair of ski and the last wood had been used in repairing our sledge, which was already nearly worn out. Of oil we had something over a gallon, the tins having

been broken and much of it lost by the capsizing of the sledge and contact with rocks. Nearly all our foot-gear was cut to pieces by the sharp stones.

The next stage of the journey was entirely impracticable for sledges, and everything must be backed down the steep shore bluffs, then over three or four miles of crevasse-riven glacier before reaching the bay ice. In our present condition we were not equal to the task. We must have rest before advancing further, and to insure rest we must have more musk oxen. We turned back to hunt for them, but a careful search failed to discover them or any fresh tracks. Our attack and scent and the sound of our pack of dogs had evidently driven them completely out of the region, and there was nothing left for us but retreat while yet our dogs were in fair condition. The snow on the land, scant when we arrived, had been rapidly disappearing since, and at least half of the return journey to the moraine was made over bare rocks. This soon destroyed the sledge completely, and the load was transported the remaining distance partly on our backs, partly rolled up in musk ox skins, and dragged by the dogs. This consumed six days.

At the moraine Henson constructed a small sledge from a pair of ski left there for that purpose, and by a forced march reached our cache, thirty-five miles inland, in spite of a snow-storm. I had now nine dogs and sixteen days' rations of musk ox meat for them.

For ourselves I had seventeen days' rations of raw venison. We were most fortunate in having favorable weather. Snow-shoes were used continuously, the sledge runners were iced twice a day, much of our venison was fed to the dogs, and every expedient known to the Eskimos was resorted to to facilitate our progress. In spite of two days' delay from illness and one from unfavorable weather, the Lodge was reached on June 25, in the twenty-five marches. One dog reached the Lodge with us. The last of our provisions were consumed at the beginning of the last march, twenty-one miles from the Lodge.

For some ten days after our return all of us were in a debilitated condition, troubled with swollen feet and legs, shortness of breath and constant diarrhœa.

From this we gradually recovered. The *Kite* arrived in Whale Sound on July 31, but the ice prevented her from entering Bowdoin Bay. Messrs. Diebitsch and Salisbury reached the Lodge overland from McCormick Bay [to the north of the camp] on Aug. 3. Lee, Henson and I returned with them on the following day, and the *Kite* immediately proceeded to Karnah, where I took on a crew of natives for walrus-hunting in Murchison Sound, then to Littleton Island and Cape Sabine [in Smith Sound, further north], thence back to Whale Sound. We were able to enter Falcon Harbor on Aug. 11. From here an attempt was made to reach the head of Inglefield Gulf for deer, but the ice prevented, and the *Kite* entered Olriks Bay. From here we recrossed the gulf to Karnah again, and thence to Wolstenholme Sound, where a number of large bull walrus were obtained. From Wolstenholme Sound we went south to Cape York, and the ice fortunately proving favorable, we advanced eastward into Melville Bay to the Loon Mountains, where the two meteorites, the "woman" and the "dog," which for ages furnished the ancestors of the Whale Sound Eskimos with iron for their knives, were by Mr. Diebitsch's skill dragged over one and one-half miles of rock, glacier, and floating ice, and safely embarked. The larger weighs about three tons.

Returning to Camp York the *Kite*, on Sept. 1, steamed west for Jones's Sound, which was penetrated to the edge of the heavy ice. Twenty-seven miles west of Coburg Island numerous traces of Eskimo were found.

We next steamed down the west side and south of Lancaster Sound. We spoke the whaling fleet, visited an Eskimo village at Dexterity harbor, and steamed

across for Godhavn, but were caught in the middle pack and held for two days. We reached Disco on Sept. 11, sailed on the 12th, touched Turnavik, Labrador, on the 18th, and arrived in St. John's on the 21st.

The season has not been a severe one in the Smith Sound region. If it had not been for the loss of my provisions I should have accomplished my purpose.

No man could have been more fortunate in having two such loyal, brave, and sturdy comrades as stood by me—Lee, as full of sand as one of his own Connecticut beaches, and Henson, unhesitating and as tenacious of his object as a bulldog. No man could be more unfortunate in being unable to reward their courage and efforts with a full measure of success.

The mapping of the Whale Sound region and the studies and ethnological collections of the Arctic highlanders have been completed. Another year's meteorological records have been obtained, and the *Kite* brings back two of the most interesting meteors in the world.

R. E. PEARY, C. E., U. S. N.

The *Kite* has on board the most valuable collection ever brought from the Arctic regions. It is mainly the work of Prof. Dyche, of Kansas University, who collected nearly 4,000 specimens of birds, eggs, and animals in the neighborhood of Holsteinborg, besides which there were also secured during the *Kite's* cruise, 24 walruses, 3 narwhal, 25 seals, 13 polar bears, and a number of other animals. Peary secured many valuable meteorological data. He thoroughly surveyed Inglefield Gulf and the neighborhood.

WASHINGTON LETTER.

WASHINGTON, SEPT. 28, 1895.

The printing and binding of the final volumes of the Census of 1890 has been stopped at the Government Printing Office on account of insufficient appropriations. This will occasion a further delay of fully six months in the completion of a work already five years out of date. Of the twenty-five volumes contemplated only nine have been distributed, while eight more have been completed but not distributed. The "copy" for three important volumes, viz.: Population, Part 2, Vital Statistics, Part 1, and Compendium, Part 3, is not yet completed.

By a happy accident some of the most experienced clerks in the Census service have been transferred to permanent positions in the Departments, so that their skill and experience can be brought into requisition in the future. It was not contemplated by the act abolishing the Census Office (which office had not been under Civil Service regulations) and providing for a Division only in the Department of the Interior, that any change in the status of the employees of the Census Office relative to the Civil Service should take place. But as the Census Office was abolished, and provision made for the establishment of a Census Division, the Civil Service Commission very properly decided that the new Division must be subject to all the rules and regulations governing other divisions of the Secretary's office. As the act abolishing the Census Office took effect on the 4th of March, 1895, and the Census Division was brought into service on that day, it was decided by the Civil Service Commission that the employees in the Census Division should be considered as within the classified service and subject to transfer the same as employees in offices over which the civil-service law has been extended by Executive order.

The Report of the National Museum for 1893, prepared under the direction of Dr. G. Brown Goode, and recently published, presents a programme of varied and interesting attractions.

We have (1) Dr. Goode's account of the organization, scope and development of the Museum; recent advances in museum methods; review of the work of the scientific departments of the Museum, including their participation in the World's Columbian Exposition.

(2) Papers by specialists describing and illustrating collections in the Museum.

The National Museum now contains over three million objects, one-fifth of which relate to ethnology and prehistoric anthropology.

Among acquisitions of wide celebrity are the Catlin Indian gallery, of inestimable value to the American historian, ethnologist and geographer; the Baird collection of North American vertebrates; the Isaac Lea collection of 20,000 conchological specimens, besides minerals and other objects; the Bendire and Ralph collections of American birds' eggs; the Lacoe collection of fossil plants; the collection of the American Institute of Mining Engineers; a valuable collection of ethnological objects collected in Tibet by W. W. Rockhill; the Japanese gold lacquers, bronzes, porcelains, carvings in ivory and wood, gathered by the late Gen. Horace Capron while U. S. Minister to Japan; the Riley collection of North American insects—about 150,000 specimens; the personal relics of Washington, Franklin, Jefferson and General Grant,—the latter deposited by the late W. H. Vanderbilt.

The late Prof. Baird was once asked whether the value of the collections in the Museum was equal to the amount expended in its maintenance. He replied unhesitatingly that he did not doubt that the entire sum could be recovered.

The ethnological collections are particularly complete for North America, and are becoming fairly representative of the whole world. Prof. Otis T. Mason has long been engaged in bringing these vast materials under control, so that any object with its full history can be consulted without delay, by means of a card catalogue.

The collection of prehistoric anthropology—one of the largest and most impressive in the Museum—is arranged in two series: (1), a synoptical series, with reference to prehistoric man; (2), a geographical series, in which the greater portion of the collection is arranged with reference to political subdivisions. An interesting collection has been received from Mrs. Schliemann, consisting of prehistoric antiquities gathered by her husband, lately deceased, during his excavations on the hill of Hissarlik on the site of ancient Troy.

The papers accompanying this report include:

Notes on the Ethnology of Tibet, by W. W. Rockhill.

Two Persepolitan casts in the U. S. National Museum, by Cyrus Adler.

Museum collections to illustrate religious history and ceremonials, by Cyrus Adler.

If Public Libraries, why not Public Museums?, by E. S. Morse.

Congress by a Joint Resolution in 1892 opened all the literary and scientific collections in Washington for the use of students, with the definitely avowed purpose of encouraging the establishment and endowment of institutions of learning at the National Capital. After a preamble, the resolution recites:

That the facilities for research and illustration in the following and any other Governmental collections now existing or hereafter to be established in the City of Washington, for the promotion of knowledge, shall be accessible, under such rules and restrictions as the officers in charge of each collection may prescribe, subject to such authority as is now or may hereafter be permitted by law, to the scientific investigators and to students of any institution of higher education now incorporated or hereafter to be incorporated under the laws of Congress or of the District of Columbia, to wit: the

Library of Congress,	Department of Agriculture,
National Museum,	Fish Commission,
Patent Office,	Botanic Gardens,
Bureau of Education,	Coast and Geodetic Survey,
Bureau of Ethnology,	Geological Survey,
Army Medical Museum,	Naval Observatory.

NOTE: The Smithsonian Institution being a private endowment, is not subject to Congressional regulation.

The Report of the Commission to the Columbian Historical Exposition in Madrid has lately been printed. The Commission consisted originally of Rear-Admiral S. B. Luce, James C. Welling and Dr. G. Brown Goode.

The Spanish Government provided a series of international celebrations in commemoration of the fourth centenary of the Discovery of America. Most prominent among these were two historical expositions to be held in Madrid simultaneously and in adjacent buildings,—one the Exposicion Historico-Americana, and the other the Exposicion Historico-Europea. The Historic American Exposition was intended to illustrate the civilization of the new continent in the Pre-Columbian, Columbian and Post-Columbian periods. The Historic European Exposition was intended to illustrate the period during which American history was most closely identified with that of Europe, viz., from 1492 to 1620.

Dr. Walter Hough of the National Museum, who accompanied the Commissioners, says the display was the greatest collection of Americana ever under one roof. It was in many respects one of the most noteworthy international expositions ever held, although from its very nature it appealed more to the scholar than to the general public, and therefore, as far as popular attendance and financial outcome were concerned, was not noteworthy.

Besides the United States Government, all the Latin-American Republics were liberally represented. There were also collections from numerous private sources. The total number of objects presented reached nearly two hundred thousand.

Mr. William E. Curtis is authority for the statement that, although the Exposition was intended to be exclusively historical and to commemorate the discovery of America by Christopher Columbus by a nation whose greatest glory is in his achievements, both the man and the event were practically ignored by Spain, and all the other nations participating, with the exception of the United States. The building was crowded with a magnificent and remarkable display of articles illustrating the art, the industry, the piety, the martial conquests, and the luxury of the reign of Ferdinand and Isabella. The archives of the government, the museums and libraries, the cathedrals, churches and monasteries, the public and private palaces of the Peninsula were stripped of their treasures to form an exhibition that was never surpassed in the extent and value of its historical features; but the only articles contributed by Spain that related directly or indirectly to Columbus were the following:

1. An autograph letter from Juan Colona, the notarial secretary of Ferdinand and Isabella, to Friar Boil, the priest who accompanied Columbus on his second voyage.

2. A certified copy, made in 1545, of the will of Diego Colon, son of Columbus.

3. A copy of the letter written to the Catholic sovereigns by Columbus after his wreck in 1503.

4. The original memorial of Don Luis Colon, grandson of Columbus, demanding the rights to which he was entitled under the contract made by the sovereigns with his grandfather.

5. Several medals.

The seventy-seven portraits of Columbus contributed by Mr. Curtis included the originals or copies of all that had been painted or published of any historical interest or artistic value up to January, 1892, and proved to be one of the most valued features of the Exposition. None were authentic. It was distinctly stated in the catalogue that there was no evidence that the features of Columbus were ever painted or engraved by any one during his life, and that the date of the earliest picture that pretended to represent him was six years later than his death.

When the Division of Ornithology and Mammalogy of the Department of Agriculture several years ago instituted a study of the

geographic distribution of life in North America, the transcontinental or zonary character of the principal life areas was not recognized, and the laws governing distribution were unknown. Zoölogists and botanists had always worked independently. The maps each had published differed radically, and no agreement could be found between the two series. *

The first biological survey by Dr. Merriam, in 1889, established the important facts that the same laws govern the distribution of both animals and plants, and that the resulting areas of distribution are essentially coincident. It showed also that the life areas of North America and the Northern Hemisphere as a whole take the form of a definite number of circumpolar or transcontinental belts, and that these belts or zones naturally arrange themselves in two principal categories or regions—a northern or Boreal, and a southern, or Austral.

In this year Congress was urged to enlarge the scope of this work, so that the Division might carry on a systematic survey. The request was acceded to, and the task of mapping the distribution of species and ascertaining the boundaries of the natural life zones was given greater prominence, and has since been pushed as rapidly as the means at hand permitted.

In 1890 a biological reconnoissance was made of south-central Idaho. In the report of this expedition † the courses of the several zones were described and the characteristic species of animals and plants enumerated.

In 1891 the most comprehensive and thorough biological survey ever undertaken was made by the Division. The expedition, which came to be known as the Death Valley Expedition, had for its field of operation an area embracing 100,000 square miles, stretching from the Pacific coast to the 113th meridian, and from latitude 34° to 38°. This area, embracing the highest and lowest lands within the United States—from Death Valley, nearly 500 feet below the level of the sea, to the peaks of the high Sierra—was selected because of the exceptional advantages it offered for studying the distribution of animals and plants in relation to the effects of temperature and humidity at different altitudes.

This expedition determined the distinctive species of each zone, traced the courses of the several zones from California to the Colorado plateau, and made large collections of specimens. The results

* Dr. C. Hart Merriam, on the geographic distribution of animals and plants in North America ; in Year Book of the Dep't of Agriculture, 1894.

† North American Fauna, No. 5.

fill three volumes, two of which have been published;* the third has not yet gone to press.

In 1892 the northern boundary of the Lower Sonoran zone was traced from New Mexico eastward across Texas, Indian Territory, and Arkansas, to the Mississippi; and in the same year Dr. Merriam published an essay on "The geographic distribution of life in North America with special reference to the mammalia." Tables of distinctive species were published, and the actual tortuous courses of zones were shown on a colored map.

In 1893 a biological reconnoissance was made of Wyoming, a large part of which was found to be from 1,000 to 3,000 feet lower than represented on current maps, and consequently to have a warmer climate than was supposed. Other work was done on the Great Plains in Kansas, Nebraska, and the Dakotas, and also in Utah and on the table-land of Mexico.

In 1894 a biological reconnoissance was made of the larger part of Montana. Other work was done in South Dakota and Arizona.

The work accomplished by the Division, Dr. Merriam says, may be summarized as follows: "The continent of North America has been divided into three primary life regions—Boreal, Austral, and Tropical—each of transcontinental extent. Their boundaries are sinuous, conforming to the distribution of temperature. The *Boreal* region stretches from Nova Scotia and Newfoundland westward to the Pacific, and from northern New England and the Great Lakes northward to the pole and southward over the principal mountains of the United States and Mexico. It is subdivided into three principal belts or zones—Arctic, Hudsonian, and Canadian. The *Austral* region is likewise subdivided into three zones—Transition, Upper Austral, and Lower Austral. The *Tropical* region comprises Central America, the greater part of the coastal lowlands of Mexico, and the Antilles. There are three points of it in the United States—southern Florida, the lower Rio Grande region in Texas and the valley of the lower Colorado River."

Dr. Merriam believes that the principles controlling the geographic distribution of terrestrial animals and plants have been discovered, and that they may be expressed as follows:

"In *northward* distribution terrestrial animals and plants are restricted by the sum of the positive temperatures for the entire season of growth and reproduction."

"In the *southward* distribution they are restricted by the mean

* *North American Fauna*, No. 7, 1893; and *Contributions from the U. S. National Herbarium*, Vol. 4, 1893.

temperature of a brief period during the hottest part of the year. It is believed that these two principles cover the fundamental facts of distribution."

Mr. W. C. Hodgkins, who represented the Coast Survey in the adjustment of the boundary line between Pennsylvania and Delaware, has written an historical account of that long-pending controversy. It accompanies the detailed account of technical operations in connection with the recent resurvey of the line.*

This boundary controversy extends over more than two centuries. It originated in a compact between Penn and Lord Baltimore in 1681, whereby it was agreed that the southern boundary of Pennsylvania should follow a circular curve at twelve miles distance from Newcastle, northward and westward from the Delaware River until it came to the 40th parallel; and that it should then follow that parallel westward to its limit of longitude. As a matter of fact, the most northern part of a circle of twelve miles radius from Newcastle court-house is almost exactly on the parallel of 39° 50′ north latitude, and it could therefore never intersect the parallel of 40°.

The Penn charter contains the first mention of this singular boundary line, almost unique in its circular shape.

After granting the charter the King commanded Penn and Lord Baltimore to "arrange" their boundary. Accordingly, Lord Baltimore met Penn's deputy at Upland, when it was found that the 40th parallel was several miles north of Upland instead of being somewhat to the south of it, as formerly supposed. Lord Baltimore at once claimed the land to his charter limit of 40 degrees, wherever it might lie. Markham, the deputy, declined to proceed with the delimitation of the provinces and reported to Penn.

With varying efforts for settlement the disagreements continued year after year. Penn died in 1718, leaving the dispute to his heirs.

The matter dragged along until 1732, when the heirs of Penn and the Lord Baltimore of that day joined in a deed to settle their boundaries. An apparent agreement was reached, when difficulties and disputes arose as to carrying out upon the ground the provisions of the deed. For instance, the question as to the proper point in Newcastle which should be taken for the centre of the 12-mile circle occasioned long debate. Lord Baltimore's friends insisted on the absurd theory that the "12 miles" meant the

* Appendix No. 8, Coast Survey Report, 1893.

periphery of the circle, while the Penns, of course, claimed that length of radius. A dispute also arose as to the true location of Cape Henlopen. In consequence of these and other difficulties nothing was done to carry out the deed.

In 1760 another deed was executed by the interested parties, in which the designated boundary was substantially the same as that of 1732. Commissioners were appointed on each side to supervise the work of demarcation. After three years of labor, and no solution reached, Messrs. Mason and Dixon, surveyors, were engaged to assist the commissioners, and they did so assist for the next four years.

While not without errors, as pointed out by Col. J. D. Graham 80 years later, the lines of Mason and Dixon were marked with suitable and enduring monuments.

When the proprietary governments were swept away by the Revolution, and the connection between Pennsylvania and the "three lower counties" became broken, the disaffected portion became the State of Delaware. The boundary between Pennsylvania and the new State of Delaware reverted to the old circular line.

In 1849 and 1850, Col. J. D. Graham of the U. S. Topographical Engineers superintended a revision of a portion of Mason and Dixon's work.

This re-survey was due to the following circumstances: The monument which had been placed in 1768 at the northeastern corner of Maryland disappeared from its place. The absence of this stone and the uncertainty as to the significance of others in the neighborhood combined with rumors of the unauthorized moving of some of the monuments produced a general feeling of doubt in regard to the northeastern boundary of Maryland, and led to the appointment of a joint commission composed of one representative from each of the three States—Pennsylvania, Maryland and Delaware.

The details of Col. Graham's operations are quite fully described in his report subsequently published by each of the three States.

Notwithstanding the fact that apparently erroneous conclusions as to the true point of junction of the three States, and as to the proper location of the circular boundary were embodied in a map which received the signatures of the three commissioners, the results were generally accepted on paper, while ignored in fact. No subsequent act of ratification seems to have been passed by the State Legislatures.

XUM

The increasing importance of the boundary as the country grew in population and wealth led to a renewed agitation of the question forty years later. In 1889 the Legislatures of Delaware and Pennsylvania passed acts authorizing commissioners to examine, survey and re-establish the boundary line between the two States. A few years later (1892) the joint commission applied to the Superintendent of the Coast Survey for assistance in the matter and the detail of an officer to execute the field work.

The new line, now marked by 46 substantial monuments, it appears reasonable to suppose, will remain the boundary.

A Geological reconnoissance across Idaho, by George H. Eldridge. This is an advance extract from the Sixteenth Annual Report of the U. S. Geological Survey. It is accompanied by a general map of Idaho and by five sketch maps of mining districts. The general map was compiled from the atlas sheets of the Survey, the maps of the General Land Office, and a rough sketch map of Lemhi County prepared by Mr. Birdsye, of Salmon City. The reconnoissance was on a northeast line through Boise and Salmon City, and was authorized as a preliminary to the future geological study of the State.

Idaho is full of great topographic features. The Snake Plains cut by the river to the depth of 400 to 1,000 feet constitute one of the prominent features of the State, and indeed of the West. They extend completely across the southern end of Idaho, and are elevated from two to five thousand feet.

The portion of Idaho lying north of the Snake Plains is an intricate region of lofty mountains and deep canyons. The altitude of the mountains varies between 6,000 and 12,000 feet, while 3,000 to 4,000 feet is a common depth for the canyons, many of which are quite impassable.

The Snake River, whose waters are derived in part from the Continental Divide in the vicinity of the Yellowstone Park, constitutes with its tributaries the drainage channel of nearly the whole of Idaho. It forms a third of the western boundary of the State.

Evidences of early glaciers are observed at many points along the route of this reconnoissance, and it is probable that their existence was quite general throughout the mountain region of Idaho. Indeed—Mr. Eldridge says—nearly all the valleys traversed show at their heads more or less evidence of former glaciers.

As implied in the title, the work is chiefly descriptive of the geologic formations and mining districts of Idaho. In a concluding paragraph, however, the writer says as to agricultural possibilities, that but little area is available for farming in comparison with that

of many other Western States. The valleys are few, but very fertile. Fruits in one locality or another attain remarkable perfection, but the area for large farming operations is at present small.

In the Proceedings of the Geodetic Conference of 1894, lately published by the Coast Survey,* Mr. J. E. McGrath gives an account of the recent extraordinary growth of the but partially explored country of Alaska, the extent and wealth of the forests, fisheries, mines, furs, etc.

Mr. McGrath was engaged for two years and over on the survey of the yet undetermined boundary line between Alaska and British Columbia.

The committee on Alaska of the Goedetic Conference recommends a topographical reconnoissance of the great inland water passages of southeastern Alaska, in order to supply needed topographic features of the hydrographic survey now quite completed. The committee also asserts that the demands of the whaling and fishing fleets, and of naval, shipping and trading vessels, require that the passes through the fog-covered line of islands of the Aleutian group, now imperfectly laid down on existing maps, should be better determined. That the great industries centred about Kadiak and the western end of the Aleutian peninsula make a survey of this section only second in importance to the one just mentioned. That a survey should be made of the mouth of the Yukon—the Mississippi River of this vast territory—now practically useless on account of almost complete ignorance of the channels and waterways through its delta. This would open up a ready means of entrance into the heart of Alaska. The river gets into St. Michael's Harbor by passing over, literally overflowing the continuous sand-bars that seek to shut up the river, the overflow skirting the western Alaskan coast for about eighty miles. No direct practicable channel to the ocean has been discovered. For some six or eight hundred miles up, the river averages from one to ten miles in width, and is very deep. It would be navigable for ocean steamers if there were any way of getting over the sand-bars at the mouth. The next eight hundred miles average about one and a half miles in width.

It has been asserted that during the period from the time of the purchase of Alaska, in 1867, to 1890, an estimate of the value of products shipped hence is about ten and a half times the price paid for it. The Census of 1890 and the annual reports of the Governor are the latest and only official sources of information for Alaskan statistics.

* Appendix No. 9, Report for 1893.

Summarizing the Alaskan work of the Coast Survey it may be said that in the year of purchase—1867—Mr. Seward arranged for a geographical reconnoissance, from which the first Coast Pilot of southeastern Alaska was compiled. This work included only the more important points from Dixon Entrance to Unalaska. In 1871, '72, '73 and '74 nothing of importance was accomplished; but in 1882 a trigonometric and hydrographic reconnoissance of the inland waters of southeastern Alaska was commenced which, with the exception of one year, has been continued to the present time.

In 1892 the longitude of Sitka was determined, and during that and succeeding years four other points for the international boundary work. The Coast Survey charts of Alaskan waters now number forty-two.

When it was found to be impossible at the last session of Congress to pass through the House the bill which had already passed the Senate to aid in the construction of the Nicaragua Canal, an amendment was attached to the Sundry Civil Expenses bill, appropriating $20,000, and constituting a board of engineers to make a survey and examination for the purpose of ascertaining the feasibility, permanence, and cost of the construction and completion of the canal by the route contemplated in the Senate bill. The Board, appointed by the President of the United States, consisted of Maj. William Ludlow, Corps of Engineers, U. S. A., Commander M. T. Endicott, U. S. N., and Alfred Noble, civilian.

It was directed to visit and personally inspect the route, examine and consider the plans, profiles, sections, prisms, and specifications for its various parts, and report to the President; and should it ascertain that any deviation from the general line of the proposed route is desirable it should so state in the findings and conclusions. The Board was required to make its report before November 1st, 1895.

The report of the Board will not be made public until it is sent to Congress. It is stated, however, that the conclusions are favorable to the present general plan of the canal with some deviation of details and increased estimates as to cost.

Under enactments made by the Legislature of Massachusetts in 1893 and 1894, that State has a highway commission composed of three competent persons, who have power to decide what roads in the Commonwealth on the application of county commissioners, or mayor and aldermen of cities or selectmen of a town, shall be laid out, constructed and kept in repair at the expense of the State, and known as State roads. The sum of $300,000 was appropriated in 1894 to make the act effective.

This enactment grew out of popular agitation, and demands for good roads, and was based on the investigations of a prior commission appointed to inquire into the entire subject.

A curious incident in connection with the outset of the work of this commission was the fact that in this late year of grace it could obtain but little data (so it is said) from any published reports as to methods and cost of construction and maintenance of roads. So, it set about acquiring the information through public hearings, communications with town officials and personal investigation. As a result, the demands of the people and the purposes of the Legislature are now being carried out under the scientific supervision of a permanent Board. All work is done according to specifications and plans furnished by the commission, the engineer in chief having charge.

The Assembly of the State of New York at its last session passed an act to provide for the construction of roads by local assessment, County, and State aid. It was not reached in the Senate, and did not become a law. The proposed act was based upon the effective State-aid law of New Jersey, modified and improved in some details, and is probably the best development of the State-aid plan of road construction. The bill provided that one-third of the total cost of construction or improvement must be paid by the owners of the land and property benefited; one-third by the County, and the remaining one-third by the State. When completed, such roads become County roads, and are then maintained at County expense.

In New Jersey, the State pays one-third the cost of construction of new highways, the adjoining property-owners ten per cent., and the County the balance, and maintains the road. Two of the leading roads are extended half way across the State, and, as it so happens, they are leading directly towards two very popular sea-side resorts. New Jersey was the first State in the Union that ever paid money under a law granting State aid for the construction of public roads. The provisions of the law, and the manner in which it has been enforced have proved satisfactory to the people of the localities where the improvements are located and to others who have witnessed the practical benefits arising therefrom. The rapidity with which this sentiment has increased is apparent in the demands from more than half the counties of the State, from which applications now on file represent enough miles of road seeking recognition under the law to absorb the present annual State allowance for two years in advance.*

* Edward Burrough of N. J., in Bulletin No. 9, Office of Road Inquiry, Dept. of Agriculture.

The want of material available for good road-making is not infrequently a serious obstacle in some localities. Much valuable information on this point has been supplied by officials of various railway companies in certain States north of the Ohio River, in reply to a circular of inquiry sent out by the U. S. Office of Road Inquiry, asking railroad managers for information in regard to the supply of good road materials, accessibility, reduced rates of transportation, etc., along their respective lines.*

In a little treatise entitled "Phototopography as practiced in Italy and in the Dominion of Canada," Mr. J. A. Flemer, of the Coast Survey, gives a short review of the more important photographic surveys, and of some of the publications on photogrammetry and phototopography, as well as a concise description of the general methods and principles of phototopography as practiced in Europe and in the Dominion of Canada, in order, he says, that this branch of surveying may become more generally known, tested, and amplified in this country.

The term phototopography should be generally adopted for all topographic surveys based on perspective views of the terrene obtained by means of the camera.

Concerning the topographic survey of the United States, Mr. Flemer says the land is so diversified and the population so unevenly distributed that the methods to be employed should also be diversified; the character and value of the different sections should govern the accuracy and amounts of detail of the survey in order to reach the quickest practically useful and valuable results. Minute and detailed methods, with ensuing accurate results, should be applied to cities and all closely settled regions, to the coast, larger rivers, and lakes, and the work should be platted on a large scale. Arid, barren, and mountainous regions, as well as prairies and swamp lands, should be more generalized in their cartographic representations, and platted on a small scale. He cites the new survey of Italy in demonstration, where phototopography has reached a high state of perfection under the auspices of the Military Geographical Institute. At present, he says, phototopography cannot replace instrumental topography; still, experience in Italy, France, Canada, Austria and Germany has proved it to be a very valuable adjunct to the plane table and transit for topographic surveys of rugged mountainous regions, if they are not too much wooded. H.

* Bulletin No. 6; Office of Road Inquiry.

BOOK NOTICES.

De Saint-Louis à Tripoli par le Lac Tchad. Voyage au travers du Soudan et du Sahara, accompli pendant les Années 1890–91–92 par le Lieut.-Colonel P.-L. Monteil, de l'Infanterie de Marine. Préface de M. le Vte. Melchior de Vogüé de l'Académie Française. Illustrations de Riou, d'après le texte et les documents du lieutenant-colonel Monteil et les photographies du Commandant Quiquandon. 4to. Paris, Felix Alcan, Éditeur (1895).

In his charming preface, M. de Vogüé classes Monteil with the greatest peaceful explorers, such as Barth, Nachtigal and Livingstone. This does not mean that Monteil is a member of the Peace Society. On the contrary, he acted throughout his long journey upon the principle that if you wish for peace you must be ready for war. He was often in difficult, and frequently in perilous, positions, but his coolness, vigilance and prudence carried him safely through all without a fight. It is essential to know the character and temper of the wild men; for, as Col. Monteil says, there are moments in the Negro country when a man must not hesitate to risk his life rather than give up a needle.

The line of march led from St. Louis, in Senegal, in a general easterly direction for about 2,200 miles to Kuka, on the western shore of Lake Tchad, and thence almost directly north across the Sahara to Tripoli, a distance of 1,300 miles.

After leaving the French Sudan, M. Monteil entered the Mossi kingdom, which covers about 40,000 square miles in the bend of the Niger. This country is ruled by a number of chiefs called Nabas, who derive their authority from the original Naba, a king who reigned at the beginning of the world, and bequeathed his empire to his 333 sons. Family affection, or the power of the number three, has kept Mossi in peace and prosperity. The villages are quiet, the lands well cultivated, and the people come and go, often unarmed, along the roads; while here only, in the Sudan, are the villages undefended by fortifications. The principal products are millet, beans, cotton and indigo, and the country is famous for its horses and asses. The inhabitants manufacture cotton cloth, silk embroideries and leather, and work in various metals.

Beyond Mossi is Sokoto, the empire which divides with Bornu

the Central Sudan. The ruling race is the Peul, or Poul, or Fellata, of which M. Monteil gives this description:

> Physically, the Peul does not resemble the negro; his complexion is a brown red, his figure slender and flexible, with fine well-shaped extremities; the face is that of the Caucasian, the nose nearly always aquiline, and the forehead high and broad; the hair very fine and without the woolly appearance.

Intellectually, the Peuls are quick and keen. They have courteous manners and are very hospitable, sober and temperate, and pure in their family life. Their organization is tribal, and they spare no pains to extend their influence in the Sudan.

At Kano, the commercial centre of the Sudan, the expedition was detained nearly four months by the intrigues of the king's courtiers. Kano is a town of about five miles in diameter and is surrounded by a stockade, 25 feet in height. Its permanent population is estimated at 60,000, and the number of those who visit the city on business during the year can hardly fall below 2,000,000.

All the pilgrims to Mecca from the Central and Western Sudan pass through Kano, and 30,000 persons, at least, frequent the market every day. The transactions are by direct exchange of articles and by payment in cowries (1000=1 franc); rarely in money. The town furnishes the Sudan and the Sahara, for the most part, with clothing and with dyed stuffs, and the yellow and red morocco skins in the markets of Tripoli, Tunisia, Algeria and Morocco, are prepared at Kano.

Besides the slaves, or captives, as M. Monteil prefers to call them, and the salt from Timbuktu, Kano imports vast quantities of kola nuts, and distributes them as far to the eastward as Khartum. The nut loses its value if exposed to the air. It must be carefully packed with wet leaves and damp cloths, and when the caravan is on the road the packages must be inspected and the wrappings renewed every few days. M. Monteil is skeptical as to the virtues of the kola. The effect of two of the nuts upon himself was to cause a feverish uneasiness, and he made no second experiment.

Leaving Kano about the middle of February, M. Monteil entered Kuka, the capital of Bornu, on the 10th of April. He spent four months in this place, well treated as to forms and courtesies, but in danger of being reduced to poverty by the incessant demands upon his purse in return for the presents—a calabash of grain or a chicken—forced upon him many times in the day. The slave brought the gift, set it down, and waited for the acknowledgment.

If this did not greatly exceed the value of the gift, the slave departed with a gesture of contempt for the European.

According to M. Monteil, the long detention of Barth and Nachtigal in Bornu was due to the successful working of this ingenious system of robbery under the form of hospitality.

As soon as his own eyes were opened, he took radical measures. When a gift came, he returned a strict equivalent, and took it back at the first sign of discontent. In this way he husbanded his resources to the end of his stay.

At Kuka he met Valpreda, Nachtigal's servant, who had played a treacherous part to his master and had become a Mohammedan. Now, after more than twenty years, this unhappy man longed for his native land, but he was kept in a state of dependence, and was closely watched when a caravan left the town.

The route from Bornu to Murzuk is one of the worst in the Sahara. Forage is scanty, and the caravans are exposed to the attacks of the Tuaregs and the Ulad-Sliman. There are few landmarks, but the line of march is directly to the north, and the leader steers by the pole-star.

It was on the 25th of October that Col. Monteil entered Murzuk, where he was lodged in the house once occupied by Miss Tinne. It was there that he heard the story of the fate which had overtaken her murderer.*

The long march ended at Tripoli, and on the 18th of December the whole party landed at Marseilles. Not long after, Col. Monteil returned to Africa, and it was during his absence that the present magnificent volume was published. This contains, besides 65 excellent illustrations, 16 maps of routes and one general map, and, in an appendix, the determinations of latitude and longitude of 118 positions.

A Chapter in the History of Cleveland, by C. M. Burton. 8vo. Detroit, The Wilton-Smith Co., 1895.

In this paper, which is addressed to the Western Reserve Historical Society, Mr. Burton gives the substance of a number of letters and documents, relating to the affairs of Northern Ohio and the neighboring States and Upper Canada for the period 1760–1818.

These documents were acquired by purchase in Canada in the year 1894. Among them are letters signed by Arthur St. Clair,

*Journal, American Geographical Society, Vol. XXVI, 1894, pp. 88–89.

Joseph Brant, the Moravians Zeisberger and Heckewelder, Wm. Henry Harrison, Arent Schuyler de Peyster, and many more, and Mr. Burton prints, in the Appendix, a deed of lands on the southerly shore of Lake Erie, conveyed to John Askin and others by the Chiefs of the Ottawa, Chippewa and Messasague Indians, for the term of nine hundred and ninety-nine years, in Consideration of the sum of Five Shillings, Halifax Currency, in hand paid, and the yearly rent of Five Shillings of the same currency, at the expiration of every year. The tract of land ceded for this price was about 60 miles in length by 80 miles in breadth, and the canny white men took the precaution of closing the instrument with the declaration that the Indians were perfectly sober at the time of delivering their act and deed.

Das Deutsch-Afrikanische Schutzgebiet. Im amtlichen Auftrage von Dr. Karl Peters. Mit 23 Vollbildern und 21 Textabbildungen, sowie 3 Karten in besonderer Mappe. 8vo. *Munchen und Leipzig, Druck und Verlag von R. Oldenbourg, 1895.*

In the introductory chapter, Dr. Peters states the various reasons which urge upon Germany the establishment of a colonial empire. These reasons are familiar enough, and there is something almost comical in the dismay with which he regards the spread of the English language. He notes that in the middle of the 18th century there were 9,000,000 of English-speaking persons in the world against 20,000,000 who spoke German, while to-day the numbers are 110–120,000,000 English against 60 or 70,000,000 Germans. He quotes Sir Charles Dilke's triumphant exclamation that the world is rapidly becoming English, and lays the responsibility for this disastrous change upon the German immigration into the English-speaking countries. Even if Sir Charles were right, there would still be cakes and ale and Germans, more or less numerous, might live their lives and speak their speech; but Sir Charles is not right. He and Dr. Peters see an imaginary world. The real world contains 1,300,000,000 of persons who speak neither English nor German, and very many of them propose to manage their own affairs.

It is a fact that the German emigration has been lost to Germany, and also that much the larger part of it has found its way to the United States. The record, as printed in the *Almanach de Gotha* for 1895, shows that the combined immigration into the United States from Germany and Austria, for the 72 years, 1821–1893, amounted to 5,715,110. This respectable number does not

go far towards accounting for Dr. Peters's 50,000,000 missing Germans. Even if these were accounted for, they would only put the two races on an equality, and Dr. Peters implies that the Germans ought to have maintained their superiority.

The description of German East Africa, its resources and prospects, is written with knowledge and sobriety and good sense. The German possessions are neither the best nor the worst on the coast. There are tracts which offer the requisite conditions for successful culture: good soil, heat and a supply of water. If the country is neither a Ceylon nor an India, its most sterile districts nowhere sink to the level of the real desert. With roads and railroads and steady, well-directed industry applied to the soil, the future prosperity of this broad region, nearly twice the size of the Empire, is assured. About a fourth part of the area is at an elevation of 4,000 feet above the sea, and may be regarded as suitable for European settlement; but the Europeans seem to be more interested in dividing than in settling Africa.

Dr. Peters's book is full of information, some of it of a superfluous kind. The *giant mountain*, Kilimanjaro, fascinates him, and, on p. 114, he takes the trouble to go through a calculation of its mass. This amounts, according to him, to 6,414 cubic kilometres, the weight of which is 12,828,000,000,000,000 kilogrammes, or 12,828 milliards of tons. It may be doubted whether any mountain was ever so handled before; but how does Dr. Peters know that Kilimanjaro is solid and not a bubble, or hollow mockery, on the face of the earth?

Numerous and excellent illustrations and three folding maps add to the value of this work.

Sopra Tre Speciali Projezioni Meridiane e i Mappamondi Ovali del Secolo XVI. M. Fiorini. 8vo. (reprint.) *Roma, Società Geografica Italiana. 1895.*

In this pamphlet Prof. Fiorini continues his instructive studies in cartography. The three special projections indicated in the title are: that proposed by the Arab geographer Albiruni in the year 1000, and adopted by Nicolosi, Delisle and Arrowsmith; that of Roger Bacon, which was sometimes employed in the sixteenth century; and that to which Prof. Fiorini gives the name of *equidistant meridian projection.* This last was in favour during part of the sixteenth century, and later examples of it are found in the Mercator Atlas of 1623 and in Fournier's *Hydrographie*, of 1667.

The oval projection, of which the *Typus Orbis Terrarum* in the

ORTELIUS of 1570 is a remarkable specimen, was in vogue for two centuries; its latest appearance, so far as known to Prof. Fiorini, being in Lotter's *Mappemonde* of 1783, in which the equatorial and polar diameters are, respectively, of 92 and 46 centimetres.

Cabinets and tables of ebony and other costly materials, adorned with the map of the world on the oval projection, inlaid in ivory, are preserved in the Trivulzi collection at Milan, in that of Count Emanuel Bertone and in the museum of the Chartreuse of San Martino at Naples.

Geogenetische Beiträge von Dr. Otto Kuntze, Membre de l'Académie Internationale de Géographie Botanique, Ordentlichem, Ausländischem und Ehren-Mitgliede mehrerer gelehrter Gesellschaften. Mit 7 Textbildern und 2 Profilen. 8vo. Leipzig, Gressner & Schramm, 1895.

The subjects of these Contributions are: Oscillation of Level in the Andes without a Catastrophe; Denudation of Deserts, at present and in the Carboniferous Age; Origin of the Chilian Saltpetre; Silicification and Petrifaction of Woods; Continental Salt-formation; and the Origin of Coal, whether from vegetation *in situ* (autochthon), from transported vegetation (allochthon), or from the sea (pelagochthon).

Dr. Kuntze finds his evidence for the quiet changes of level in the Andes in the beds of iron-stained sands and laterite and in the similar flora of widely-separated regions, such as southern Chile and south-western Patagonia, on the one hand, and the coast mountain ranges of southern Brazil, on the other.

The supposed evidences of glacial action in the pampas are referred to the wind and the changes of temperature.

The deposits of saltpetre are attributed by Dr. Kuntze and by other authorities to the llamas and the guanacos.

The paper on Petrifaction of Woods is a sharp reply to a criticism of the author's views by Dr. A. Rothpletz.

The salt-deposits in regions remote from the sea are held to be the result of the decomposition of minerals containing chlorine.

Dr. Kuntze comes to the conclusion, after a long and learned argument, that the coal-formations are of marine origin,* and he meets the objection based on the rootlets of the plant *Stigmaria* by affirming that the supposed rootlets are floating leaves. A sys-

*...ist die pelagochthone Entstehung Carbonischer Kohlenfelder die einzige richtige Erklärung;...(p. 77).

XUM

tematic botanist himself, he recognises the fact that every naturalist, at the present day, must be a specialist and, as such, must be content to fall behind in matters not of his province. This consideration, he says, does not hinder some specialists from looking down in a lofty fashion on their fellow-workers in other fields, nor yet from expressing decided opinions on subjects which they have not mastered. Many are clouded by their own conceit, but if Dr. Kuntze speaks with authority on questions of geological knowledge, it is to be remembered that geology was his first love.

Geographische Zeitschrift, Herausgegeben von Dr. Alfred Hettner, a. o. Professor an der Universität, Leipzig. Erster Jahrgang, Hefte 1, 2, 3 u. 4. 8vo. Leipzig, Druck und Verlag von B. G. Teubner, 1895.

In the introduction to the first number of this new periodical, Dr. Hettner makes four groups of the subjects to be treated, viz.:

1. Researches into problems in all branches of geography and the related sciences;
2. Characteristics of individual regions, as well as descriptions of countries and peoples and studies of the aspects of nature;
3. Surveys and discussions of the changes in geographical conditions, such as the alterations in political geography, the movements of population, the developments of commercial intercourse, etc.;
4. The more important questions concerning methods of geographical inquiry and instruction.

The list of contributors contains many well-known names, and among the articles already published are the following: The Treaty of Shimonoseki in its Geographical Relations, by Baron von Richthofen; The Influence of Climatic Variations upon Crops and the Prices of Corn in Europe, by Prof. E. Brückner; The Baltic and North Sea Canal, by Privy-Councillor Launhardt; The Yellowstone National Park, by Privy-Councillor Credner; The Causes of Steppe Formation in Europe, by Prof. Nehring; Recent Investigations and Views on the Structure of the Earth-Crust, by Dr. Alfred Philippson.

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JULY–SEPTEMBER, 1895.

BY PURCHASE.

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BY GIFT AND EXCHANGE.

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Eleventh Annual Report of the Commissioners of the State

Reservation at Niagara for the Fiscal Year from Oct. 1, 1893, to Sept. 30, 1894.

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Bulletin, Vol 3, Nos. 12 and 13, March and April, 1895.

From the University of the State of New York, Albany:

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From J. H. De Bussy (Pub.), Amsterdam:

De Indische Mercuur, 18e Jaargang, 1895, Nos. 25–38.

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Tijdschrift, Deel 12, 1895, Nos. 3, 4.

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Proceedings, Vol. 21, No. 2, 1895.

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Bulletin, Tome XX, Fasc. 1.

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From the Johns Hopkins University, Baltimore:

Circular No. 120:

Studies: The Genesis of California's First Constitution (1846–49), by Rockwell Dennis Hunt, A. M.; Benjamin Franklin as an Economist, by W. A. Wetzel, A. M.; The Provisional Government of Maryland (1774–1777), by John Archer Silver, A. B.

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XIII Jahresbericht, 1894, Heft II.

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Prehistoric Man at the Headwater Basin of the Mississippi, St. Paul, 1895, 8vo.

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From the Colorado Scientific Society, Denver:
The Recent History and Present Status of Chemistry, Presidential Address by Prof. Chas. S. Palmer, Dec. 17, 1894; The

Volcanic Rock of Alum Hill, Boulder County, Colo., by C. Irving Andrews, June 3, 1895; Vein Structure in the Enterprise Mine, by T. A. Rickard; The Determination of Bismuth in refined Lead and in Lead Bullion, by L. G. Eakins; The Non-Existence of Cyanide of Zinc in Alkaline Solutions, by Nicholai Anderson.

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